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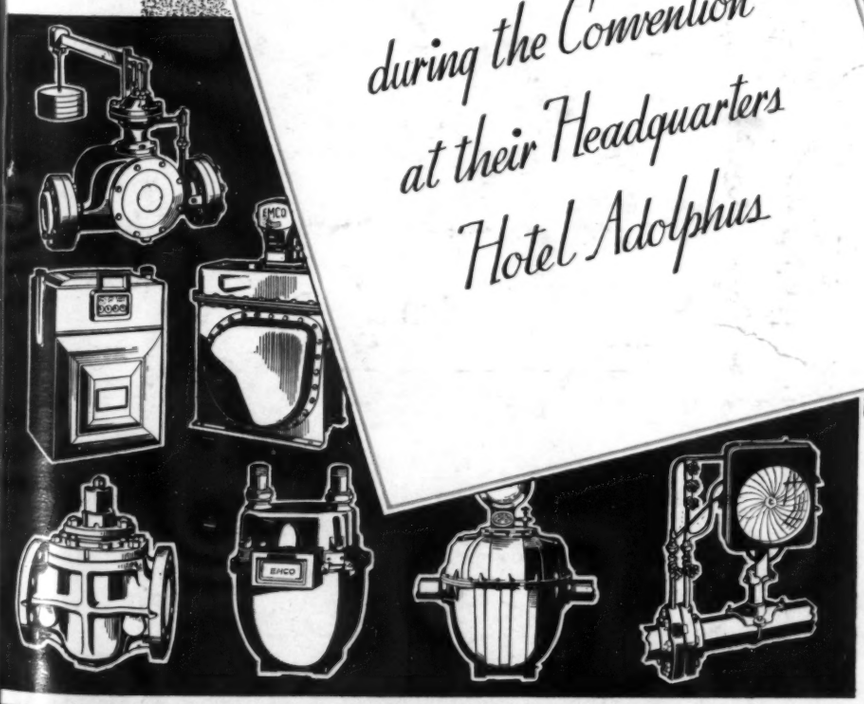

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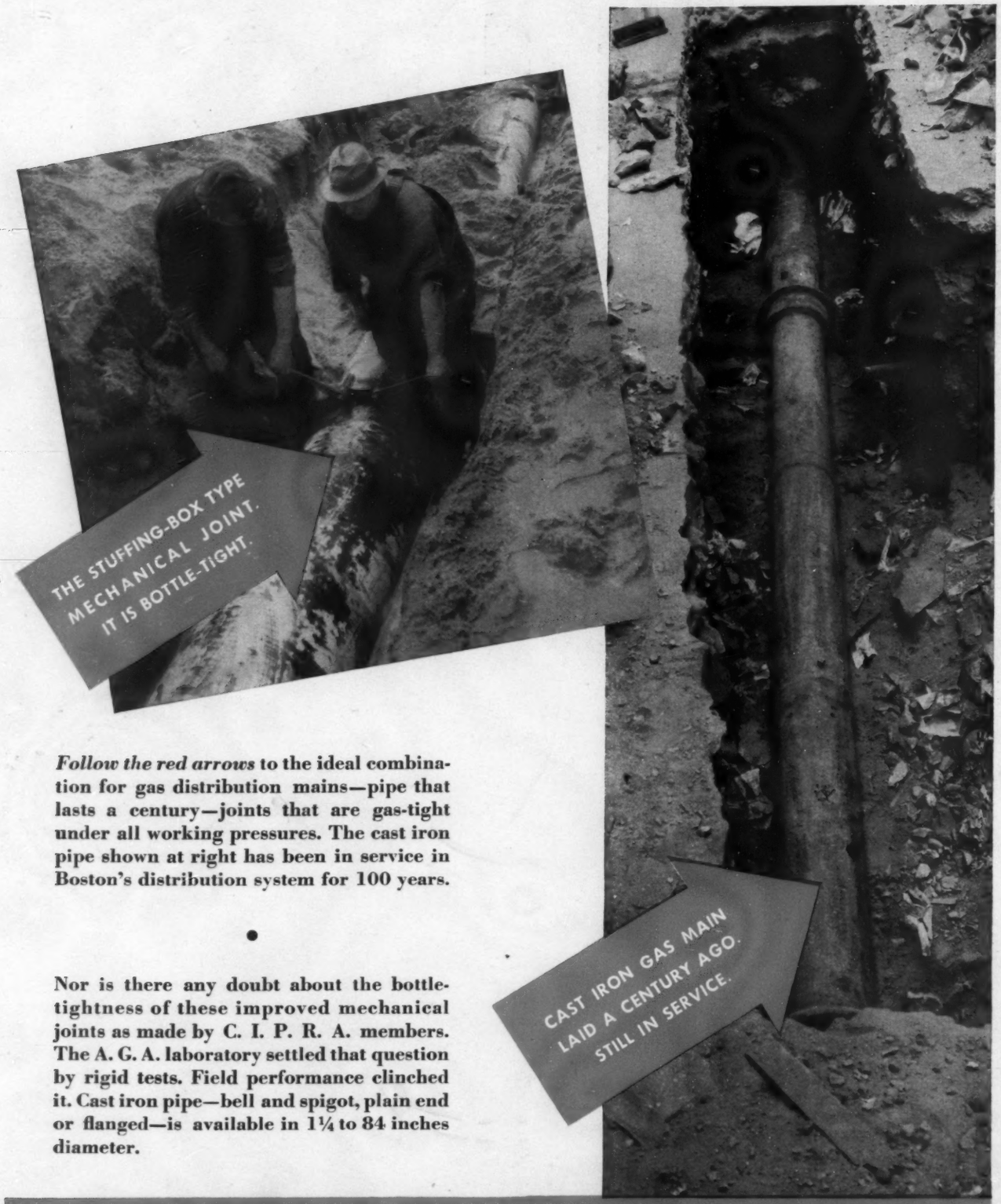

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Publication Office: 810 South Spring Street, Los Angeles, Calif.—Phone Michigan 1481
District Office: 1064 Peoples Gas Building, Chicago—Phone Harrison 8536

JAY JENKINS, Publisher GEORGE H. FINLEY, Editor CRAIG ESPY, Mid-Western Manager
ANATOL FOMILYANT, News Editor W. G. RUSSELL, Field Representative

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May, 1936. Volume XII, Number 5. GAS is published monthly by Western Business Papers, Inc., at 810 South Spring Street, Los Angeles, California. Subscription price (in advance), 25 cents the copy; $2.00 per year; 2 years, $3.00; $3.00 per year foreign. Entered as second class matter June 1, 1925, at the post office at Los Angeles, under the Act of March 3, 1897. Copyright, 1936.

OFFICIAL PUBLICATION: Pacific Coast Gas Association; Southern California Meter Association.

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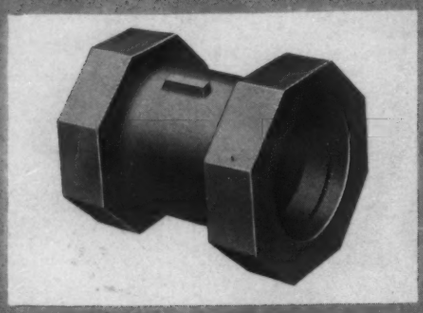

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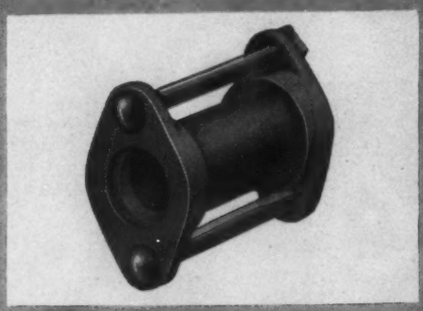
Nuts when drawn up completely cover threaded portion of center. Gaskets interchangeable with same size of No. 1 Couplings, eliminating necessity of carrying duplicate stocks.



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Rugged construction . . . steel center and malleable flanges . . . feature this coupling and assure permanence in installation.

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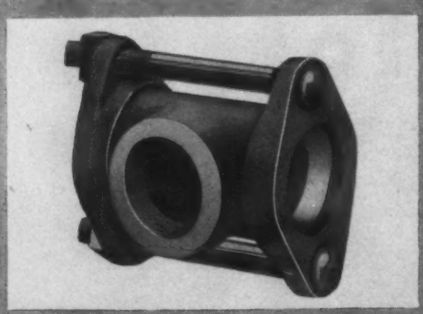

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Center is constructed of cast iron and has boss tapped for service line connection. Flanges are of malleable iron, assuring high resistance to corrosion.

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... more than half a million horsepower in successful operation

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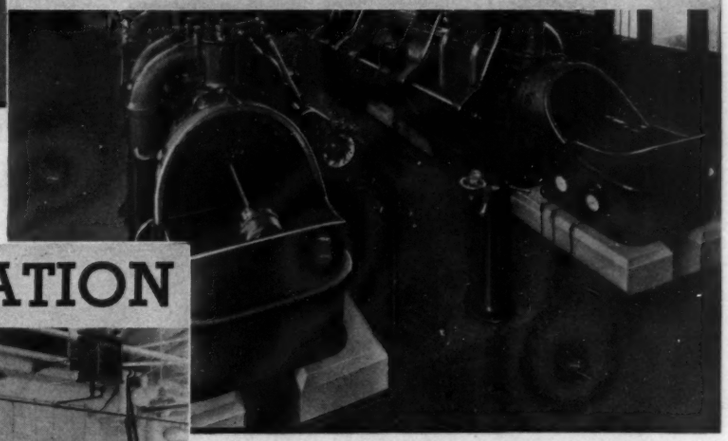
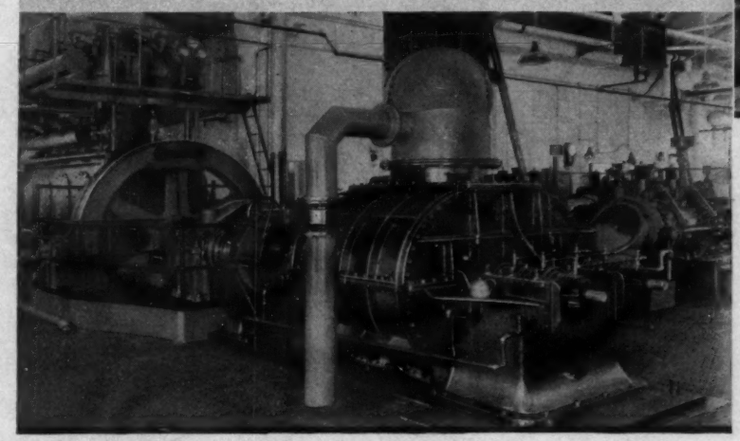


One of two Worthington 900 horsepower 20" x 30" Horizontal Twin-Tandem Gas Engine Gas Compressors, at Newtown Station of Brooklyn Union Gas Company, Brooklyn, New York

POWER GENERATION



Worthington 500-horsepower 18" x 25" Vertical Gas Engine, operating Roots-Connersville Blower at Plant of Boston Consolidated Gas Company ... Worthington Twin-tandem Horizontal 18½" x 20" Gas Engine Gas Compressor in background

30 to 1800 horsepower

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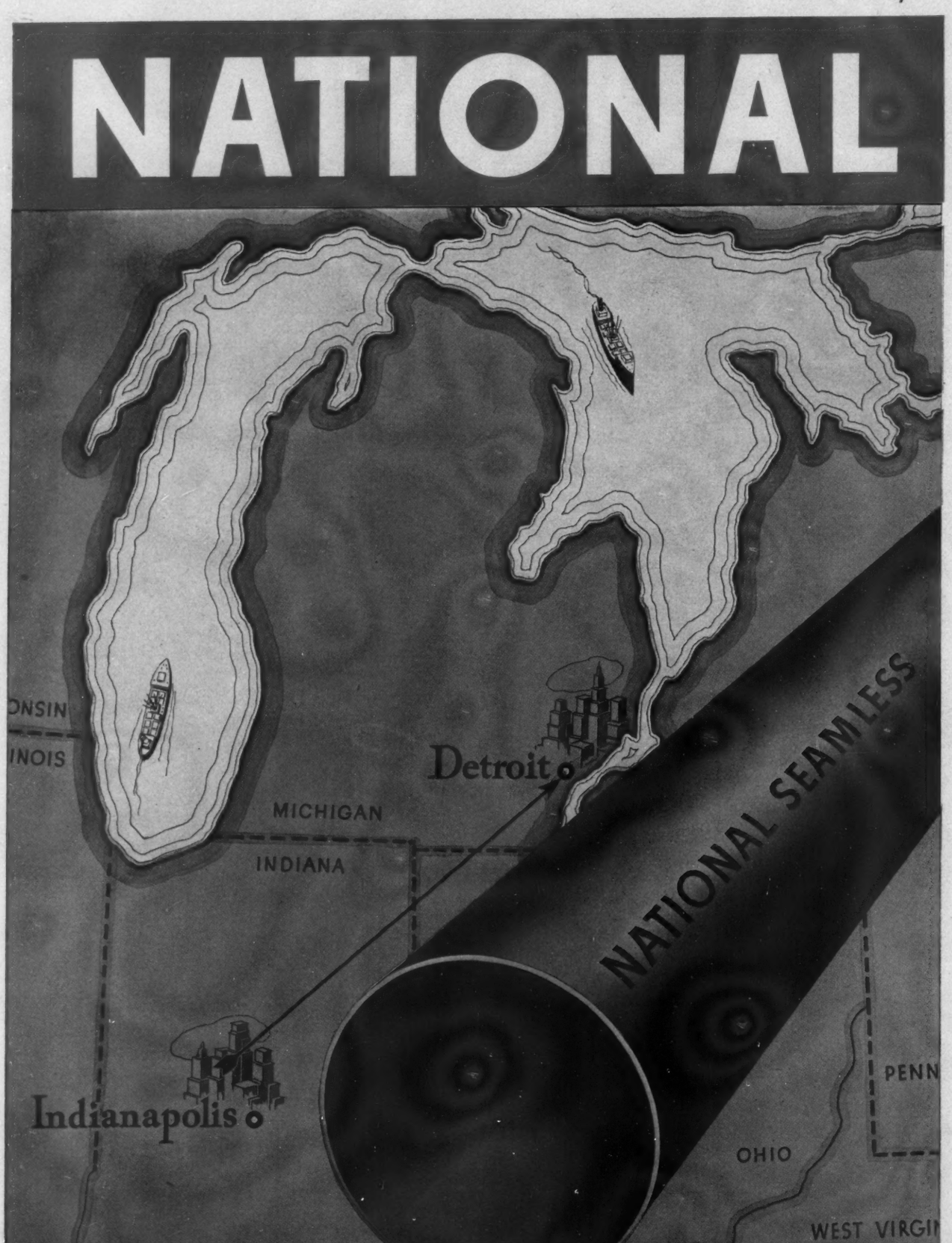
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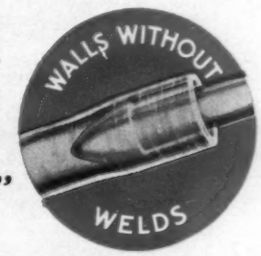
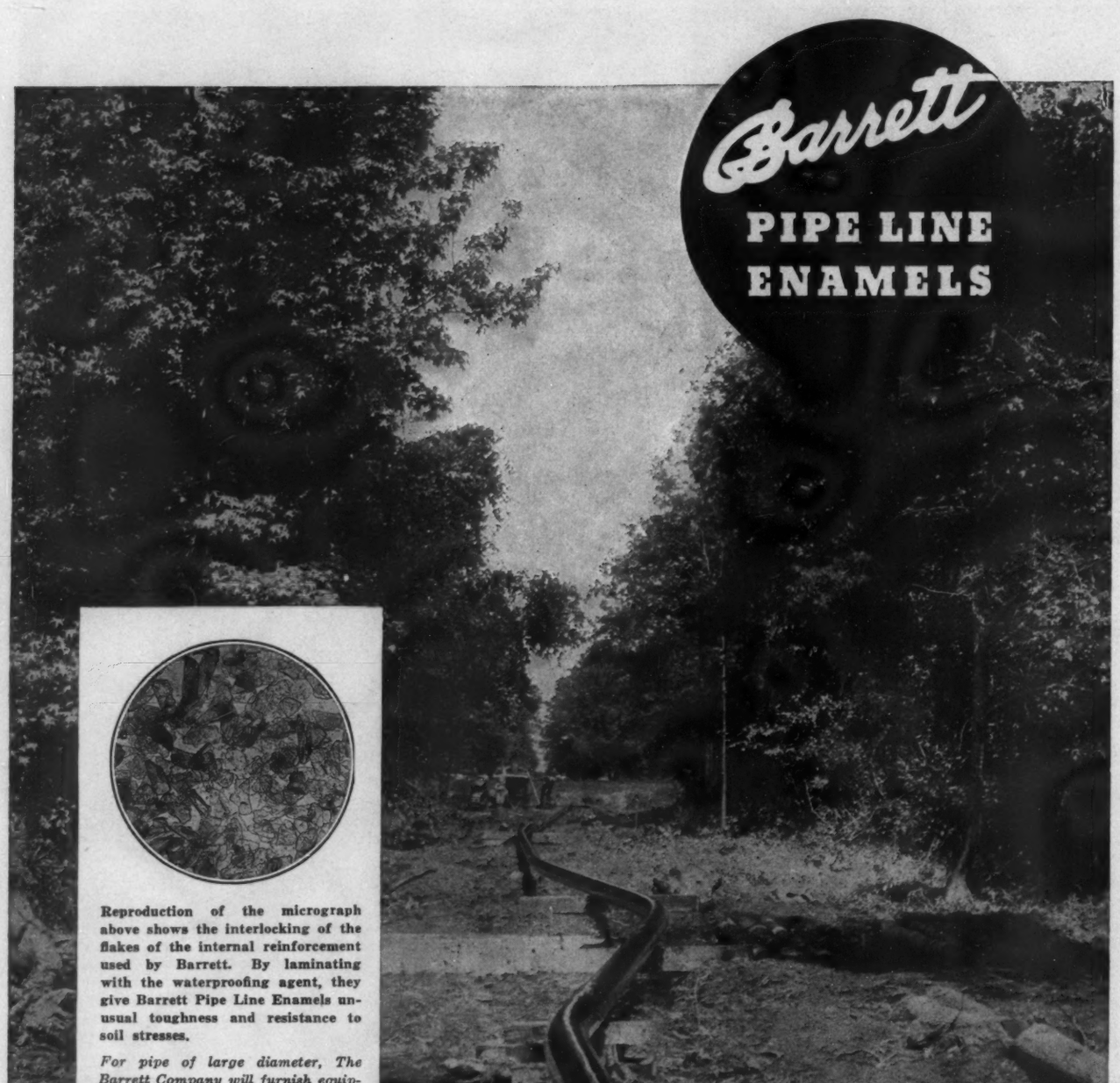


NATIONAL TUBE COMPANY

UNITED STATES STEEL



Reproduction of the micrograph above shows the interlocking of the flakes of the internal reinforcement used by Barrett. By laminating with the waterproofing agent, they give Barrett Pipe Line Enamels unusual toughness and resistance to soil stresses.

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Courtesy United Gas System.

Solving the pipe line engineers' corrosion problem

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THE BARRETT COMPANY, 40 RECTOR STREET, NEW YORK, N. Y.

GAS
May, 1936

Guest Editorial

NATURAL GAS INVENTORY

By WM. MOELLER, Jr.

Chairman, Natural Gas Department, American Gas Association; Vice-President, Southern California Gas Company

CONVENTIONS are, or should be, times of stock-taking, forecasting, charting paths along which an industry must move of its course is to be one of advance rather than retrogression. As this is written the natural gas industry of America prepares for its annual inventory. Against a historic and colorful Texas background the American Gas Association Natural Gas Department has called its membership into session, at Dallas, May 5th to 8th.

With this significant opportunity for conference at hand it is appropriate to set forth a few of the broad issues which concern natural gas service, and which imperatively call for the best thought of the industry's leadership in their solution.

There is the ever-recurrent matter of conservation —peculiar to the natural gas branch of the industry. Of late years Texas has been much in the limelight for its difficulties in effecting a permanent conservation plan, but the problem is in no wise limited to Texas. Wrapped up in the conservation issue is the future of our industry, if we are wise enough to take the long view. From the present outlook conservation appears to be a matter for individual state action; natural gas men in every section should bring to this knotty problem a broad vision and a determination to pool their interests in this solution. More than any other factor, the need for conservation invests natural gas service with a public interest. Delay in effecting workable conservation plans in any locality is bound to bring the industry into some measure of disrepute —even though the factors causing wastage lie beyond its full control.

National regulation of natural gas service in its interstate aspects, is another broad subject which will not wait indefinitely for attention. While the industry can demonstrate beyond question that additional regulation of its pipe line operations across state borders is not needed at this time, and while there is reason to feel that the issue will not be brought to a head in the present session of Congress, still it would appear the course of wisdom for natural gas men to anticipate the possibility that additional regulation *may* be forced upon it eventually. If regulatory plans are to be drawn sanely, and are to incorporate no provisions which will handicap the industry in rendering its essential services, they must have regard for the practical aspects of gas transmission enterprises—and no one can supply that practical viewpoint except gas men themselves

Our technical problems we have always with us—each year new ones, as our standards of service grow more exacting. By and large, our engineers can be relied upon to produce the proper answers. And technical progress, once made, is ground which can be held without dispute.

This is not so true on the sales side. Superior showmanship of competing fuels, and political influence favoring some of our competitors, may throw the preference away from our product, despite its economic advantages. We can thank our electrical competition, these last years, for awakening us to the vital need for better salesmanship. The day is past, if it ever existed, when natural gas will sell itself. We are doing a better sales job now, in most natural gas centers, and the curve of our sales efforts clearly must be upward from now on. It is not sufficient that our sales tactics approach or equal those of the electric industry in effectiveness. They must be definitely superior if we are to hold our present advantage.

These broad subjects which rest with the industry for thoughtful consideration are not to be dismissed at a single sitting. They call for setting up continuing policies which will guide over a period of years. Such gatherings as that now due at Dallas can stimulate the shaping of the industry's attitudes toward its basic problems.

MODERN METHODS in industrial gas measurement

Base Pressure and Base Volume Indexes take mathematics out of customer relations . . . eliminating the need for chart calculations to determine billing data.

The modern installation of the Atlanta Gas Light Company illustrated gives the customer at all times a complete knowledge of fuel consumed.

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These modern installations all over the world are adding to the value of industrial gas service.

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The World's Largest Manufacturers of Gas Meters and Allied Apparatus
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GENERAL OFFICES: 60 EAST 42ND STREET, NEW YORK, N. Y.

May, 1936

GAS

Vol. XII, No. 5

TWELFTH YEAR OF PUBLICATION

LOS ANGELES—810 South Spring Street . . 1064 Peoples Gas Building—CHICAGO

It HAD to Be Done!

WITH the current issue this publication enters its 12th year, and enters it with a new name at its masthead. There are good reasons for the change to *G A S*. The need for such a change has been growing more evident year by year.

When *Western Gas* began publication in 1925 it was founded to cover an unserved field in western America. There was definite need for a publication which would keep gas industry men of the 11 western states abreast of what developed in their own territory from month to month, as well as bring to them highlights of the national scene.

For a brief time *Western Gas* circulated only within this active western field. But almost coincident with the magazine's founding there began in the Southwest and Midcontinent sections the natural gas expansion which took fuel resources of these rich areas to a dozen states unserved with natural gas, and stimulated a wave of gas industry activity which bids fair to continue indefinitely. *Western Gas* at the outset of this expansion saw the place to be filled by an active publication which would chronicle these fast-moving developments. Its horizon widened after the first year or two of its life, to include the territory bounded roughly on the east by the Mississippi River. That its entrance into this field was welcomed is best attested by circulation figures of record over the past 10 years, during most of which time the magazine has led all other gas industry publications in these sections.

Meanwhile it developed that the publication's editorial contents—built around progressive commercial practices and pioneering technical progress of companies within its circulation area—came into demand among eastern readers, alert to follow developments at all points in their industry. Without active solicitation on the part of the publishers, a sizable list of volunteer readers grew in the eastern section, to a point where *Western Gas* lost its early sectional character.

The new masthead, therefore, merely puts the stamp of an appropriate name upon a national coverage which has been maintained for much of the publication's life. Editorially, the outlook of *Western Gas* has always been national, though much of its subject-matter has originated among western companies. As natural gas has reached into new territory the editorial scope of the publication has reflected the broadened coverage.

IN this and subsequent issues of *G A S* the reader may expect a continuation of the editorial policies which have made the publication useful in the past. The staff will continue to do a good reporting job, so far as the news of the industry is concerned. Through a combination of staff-written and contributed articles the feature section will continue to bring the best of the industry's load-building, utilization, and engineering ideas before its audience. The abstracts department, which has condensed much valuable material into each issue for the past two years, will be maintained. The Annual Technical Edition—a high point in each year's editorial service—will be produced as usual this year as the August number. And from time to time *G A S* will continue to offer its subscribers the results of industry-wide surveys.

Especial attention is called to the two national surveys which are a part of the current issue—one reflecting 1935 company-dealer merchandising activities of many representative companies, the other reporting natural gas transmission line construction throughout the industry. Cooperation of the many companies from coast to coast which have made these surveys possible is acknowledged with appreciation.

For *G A S* the publishers ask only a continuance of the friendly reading which has been accorded *Western Gas* for the past 11 years. During 1936 this publication is reaching every gas company in the United States which has 5,000 or more meters, and a host of smaller utilities. As in the past, suggestions which will help to produce a more serviceable gas industry medium are actively solicited from our readers everywhere.

NATURAL GAS INDUSTRY CUSTOMERS—GAS SALES—REVENUE
1929—1935

	1929	1930	1931	1932	1933	1934	1935
CUSTOMERS*							
Domestic	4,831,000	5,228,300	5,231,900	5,193,600	5,096,000	5,276,000	5,433,000
Commercial	299,600	325,600	392,600	393,900	384,000	395,000	412,000
Industrial	17,000	18,700	21,700	23,700	23,000	25,000	27,000
Miscellaneous	1,400	2,100	2,200	1,900	2,000	2,000	2,000
Total	5,149,000	5,574,700	5,648,400	5,613,100	5,505,000	5,698,000	5,874,000
GAS SALES (Mc.f.)							
Domestic	311,963,000	324,972,000	318,835,000	300,295,000	281,498,000	284,482,000	306,221,000
Commercial	54,220,000	57,804,000	65,310,000	74,135,000	71,254,000	76,532,000	86,275,000
Industrial	580,107,000	565,507,000	485,500,000	424,343,000	476,356,000	587,898,000	662,850,000
Miscellaneous	11,597,000	10,307,000	9,605,000	9,058,000	8,633,000	11,358,000	13,345,000
Total	957,887,000	958,590,000	879,250,000	807,831,000	837,741,000	960,270,000	1,068,691,000
REVENUE (Dollars)							
Domestic	202,232,000	216,654,000	217,857,000	209,623,000	196,689,000	197,248,000	210,842,000
Commercial	28,917,000	30,690,000	34,902,000	36,414,000	34,985,000	36,182,000	40,346,000
Industrial	114,502,000	109,401,000	86,991,000	72,465,000	76,025,000	92,405,000	104,845,000
Miscellaneous	2,277,000	2,153,000	1,298,000	1,426,000	1,449,000	1,934,000	2,034,000
Total	347,928,000	358,898,000	341,048,000	319,928,000	309,148,000	327,769,000	358,067,000

Note: Domestic includes House Heating. *Customer figures are monthly averages for each year.

WHAT IS THIS NATURAL GAS INDUSTRY?

THIS Annual Natural Gas Edition of *GAS* would not be complete without a few summarizing figures to show the growth and current status of the natural gas industry. Cooperation of Paul Ryan, chief statistician of the American Gas Association, and G. R. Hopkins, acting chief economist of the Bureau of Mines Petroleum Economics Division, has provided the totals which appear on this page.

The table above, from A.G.A. sources, shows customer, gas sales, and revenue totals for a 7-year period, crediting natural gas with nearly 6 million customers last year on an average monthly basis. This represents service to a population of approximately 30 million, distributed over 34 of the 48 states.

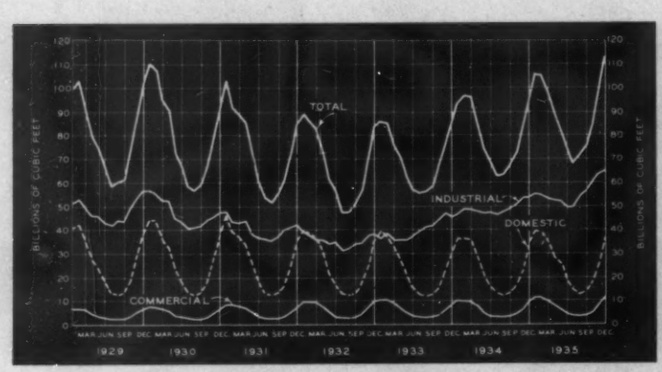
Since the A.G.A. basis of classification includes mixed gas companies with manufactured, the table above does not indicate the full extent of natural gas service. Bureau of Mines figures show 7,597,000 customers for natural gas as of December 31, 1934. In this connection it is interesting to note from A.G.A. tables that manufactured gas companies in 1929 purchased only 1,578 MM c.f. of natural gas for mixing, while by 1934 this had grown to 41,122 MM c.f.

It will be seen from the table above that natural gas has fully recouped its depression period losses, and gone on to new highs in all divisions—customers, sales, revenues.

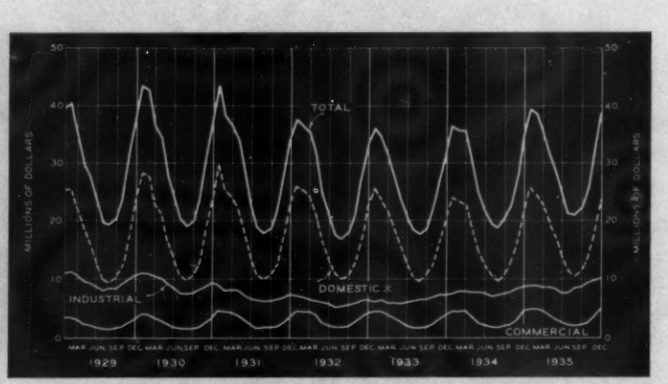
Investment in the natural gas industry at the present time is estimated from A.G.A. records to be approximately 2½ billion dollars. The industry at the end of 1934 employed some 54,000 workers.

Miles of main in natural gas service totalled 169,100 at the beginning of last year, says the A.G.A. In 1929 the Bureau of Mines estimated that some

(Continued on Page 66)



MONTHLY SALES OF NATURAL GAS—1929-1935



MONTHLY REVENUE FROM NATURAL GAS SALES

RELEASING SURVEY DATA TO DEALERS

By F. W. THOMPSON

Los Angeles Gas and Electric Corporation*

CONSUMER surveys which have as their objective a market analysis always yield two sets of information which are of commercial value. These are prospects for new appliances and market statistics. The release of these two sets of information to the dealer, together with his use of them and the results obtained from their use, are the points which will be considered in this discussion.

The subject of releasing appliance prospects to dealers raises some of the following questions:

1. Do dealers exploit prospect leads sufficiently to justify the activity?
2. Does the search for prospects by the utility and their development by the dealer increase the net amount of sales?
3. How much consumer information should be given to the dealer on prospect leads?

The extent to which the dealer will exploit prospects is, of course, dependent upon the profit to the dealer and his facilities for developing business from this source as compared to other available sources. These two factors are affected by a number of conditions, such as how close the prospect is toward a sale when the dealer receives the lead, the degree of competition among dealers, the general market for appliances, and on the type and ability of the dealer salesman.

Whether the development by dealers of prospects secured from surveys increase the net amount of sales depends upon the degree in which the prospects are worked. Field canvassing, calling on prospects and developing sales from consumers who should buy appliances because their existing equipment is outmoded or decrepit, but who are not actually in the market at the time of contact, is specialty selling as contrasted to clerk selling. The term "specialty selling" in this paper will be used to mean creative or development selling. If the appliance business is so good that a sufficient number of prospective purchasers will come into the store, then the dealer does not have the incentive to develop field prospects that need any degree of educational selling. The net value to the utility in securing prospects for dealers lies either in obtaining a gas appliance sale where the consumer was, at the time, considering the purchase of electrical appliances, or in the selling of an appliance when the consumer needs it instead of waiting for him to buy on his own initiative in the indefinite future. Securing prospects who are ready to buy without having to be sold on the idea and handing them to the dealer must find its justification in good will and friendly relations with the dealer, rather than in an increase in appliance business.

The third point—how much consumer information should be given to the dealer on prospect leads—should be considered from the standpoint of what degree of specialty selling is being practiced or should be practiced. Usually, in a market survey, a great deal of consumer information is obtained for statistical purposes, such as type and condition of existing appliances, class and size of house, whether consumer is owner or tenant, and, in many cases, general living conditions and approximate purchasing ability. There is the choice, therefore, of giving as a prospect lead simply the

*Presented at the Spring Conference, Pacific Coast Gas Association, Sales and Advertising Section and Accounting Section, Los Angeles, Calif., March 19-20, 1936.

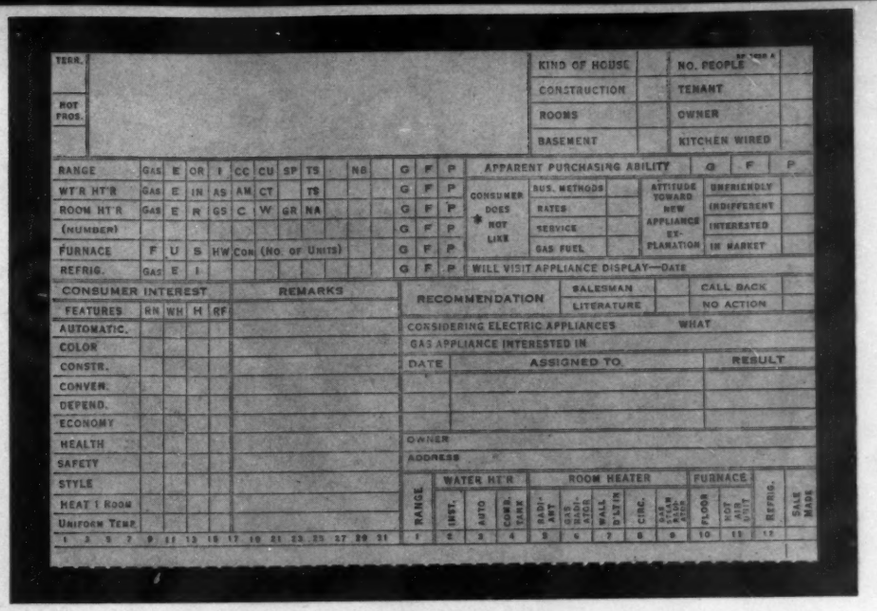


FIG. 1. FIELD SURVEY CARD

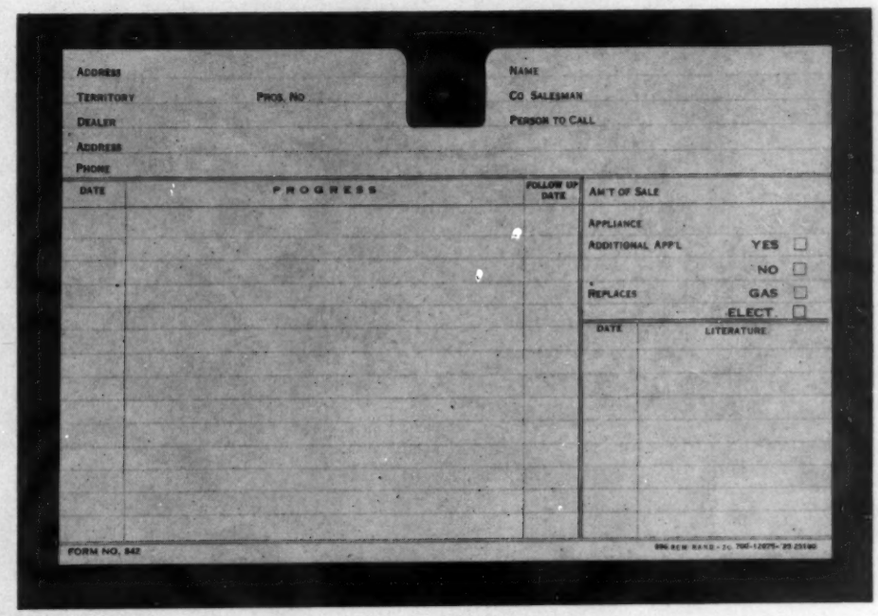


FIG. 2. SALES PROGRESS CARD

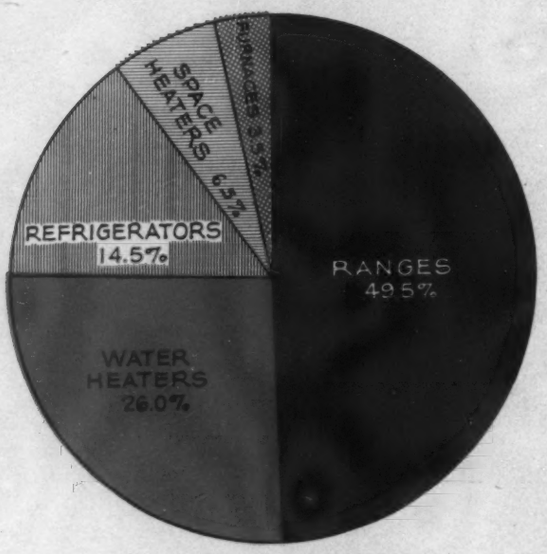


FIG. 3. PROSPECTS BY APPLIANCES
(Total Prospects 863)

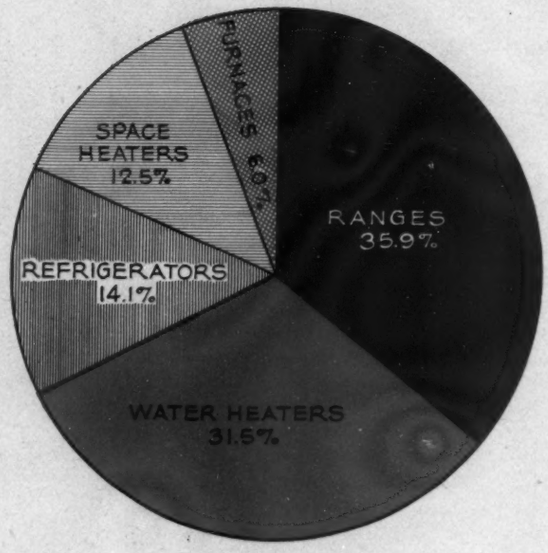


FIG. 4. SALES BY APPLIANCES
(Total Sales 184)

name and address of the consumer and the appliance to be sold or, in addition, of including a background of consumer conditions under which the sale must be made. If the already-sold-prospect is the only type that will be worked by the dealer, then, obviously, the name and address of the consumer is all that is necessary. On the other hand, there is the opportunity for creative selling and making a more effective sales approach and sales talk in the use of consumer information. I believe we should be particularly interested in this latter type of selling, for it requires a lot of missionary work and education in which the utility can better afford to take the initiative, and the results make for sales in addition to those that the dealer makes in his normal course of business.

Getting Quality Prospects

The Los Angeles Gas and Electric Corp. has had some experience in both methods of releasing prospects to dealers. Our Gas Distribution Department has, for the past two and one-half years, carried on a regular prospect-seeking activity in connection with the meterman's service work. Prospects secured in this manner are turned over to the Sales Department to be allocated to dealers.

An appliance prospect card was used by our metermen in this activity. On this form, the field man fills in the name and address and the appliance for which the consumer is a prospect, together with any remarks. Since it was found that too many names were turned in as prospects from which the dealer could make no sale, it was necessary to qualify the leads and release only the ones which appeared to be the best. In order to have a basis for so qualifying prospect leads, the meterman submitting the prospect was required to give additional consumer information on the reverse side of the card, on which appeared these quesions:

Is the prospect owner ☐ or tenant ☐ ?

Do you *know* that the prospect is financially able to purchase? (Based on some voluntary statement or remark made)

OR

Is it your *opinion* that the prospect is financially able to purchase?

Approximately on what date will the prospect purchase?

Did the prospect state a desire to have a dealer representative call?

OR

Did the prospect state a desire to have a sales department representative call?

Does the prospect prefer any specific make (trade name) of appliance?

The first question, "Is the prospect owner or tenant?" was necessary in the case of water heater prospects, where the appliance is practically always a part of the house property. The next two questions regarding the prospect's financial ability to buy is an attempt to distinguish between those consumers who may need and desire new appliances from those who, in addition, are capable of purchasing. The approximate date prospect will purchase indicates whether the prospect is actually in the market at the present time. On the next question, if a prospect has stated the desire to have a dealer representative call, we know that the consumer is actively interested. Any specific make of appliance for which the prospect expresses a preference is indicated in the last question. This enables us to give the prospect to a dealer handling that particular appliance. The prospects are qualified at the Gas Distribution Department and sent to the Sales Department, where a dealer prospect card is made out, giving simply the name, address, the appliance to be sold and any pertinent remarks. Sales resulting from these prospects have varied from 15 to 30 per cent.

10,000-Consumer Survey

A survey of 10,000 consumers has just recently been completed, which permits a more accurate analysis of sales from prospects issued to dealers. The principal object of this survey was to determine the type, age and condition of both gas and competing electrical appliances in our gas territory and their relative saturations by income groups; in other words, a market survey to ascertain the nature, condition and location of sales possibilities, not only of our own, but also of our competitor's market. The statistics, so far, have accomplished this purpose beyond our expectation. The secondary objective was to set up a more effective system for releasing and controlling prospects to dealers. It is with this second objective that this paper is concerned.

The field work on the survey was done by our Gas Distribution Department. The contact with the consumer was on the basis of an inspection and adjustment of all appliances which were in need of service. This method afforded an excellent opportunity for a complete inventory of appliances and for the securing of prospects.

Fig. 1 shows the Field Card which we used in this work. The name and address were printed in the blank space at the top by the addressograph. Although this card seems somewhat complicated, due to amount of information contained and because a part of it is coded, the form is really very simple to use and requires an average time of 2 minutes to fill out. There are three

main divisions of information given—appliance inventory, sales contact results and general consumer data. The appliance inventory is contained in the section just below and to the left of the space for address. This part is coded and the surveyor merely checks the items which apply. You will note that the check system of entering the data is used throughout the card. This method is not only quick and easy for the field man, but results are more uniform and are in a form to be easily compiled. Sales contact results consist of consumer interest, attitude toward new appliance explanation, whether or not consumer is considering competing appliances, and surveyors' recommendation. General consumer information is shown as kind, type and size of house, number of people in the family, owner or tenant, public relations and apparent purchasing ability. It is, of course, not always possible to obtain complete information, depending upon the conditions of the surveyors' contact, but returns on the whole have been very satisfactory.

As the Field Cards were completed, they were sent to the Sales Department, where they were first inspected for prospects. After this operation, all information was transcribed on to Power's Punch Cards for statistical analysis. In the case of a prospect, an Appliance Prospect Card was made out, giving the name and address of the dealer to whom the prospect was assigned, the name and address of the consumer, the appliance to be sold, and remarks on consumer conditions not covered on the reverse side of the card. On the reverse side was transferred a part of the appliance inventory and general consumer information obtained on the Field Card. Separate columns are included for each appliance classification, giving type of appliance and approximate age. Features of the appliance having special appeal for the prospect are checked in another column. Type and construction of house, and whether occupants are owners or tenants, are also indicated.

It is intended that this Appliance Prospect Card be used by the dealers' salesman, and that enough consumer information be given to help him plan his sales approach and sales talk. Field remarks of the salesman are made in the space provided. If a sale is made, the amount is shown, and also whether the article is an additional appliance or replaces existing gas or electric equipment.

For the purpose of obtaining a closer control of prospects issued, and to determine if a reasonable number of follow-up calls were being made before the lead was turned down as no good, a Dealer Office Sales Progress Card was provided, Fig. 2. The top part of this card was filled in and sent with the dealer salesman's prospect card. The dealer was asked to keep this sales progress card on file in his office so that it might be inspected periodically by our representative. The date of the salesman's call, results of the call and the follow-up date were kept by the dealer on this form. Our contact man called on the dealer once a week for the purpose of making out a sales progress report. The current calls were transcribed onto our weekly prospect report form. This report was returned to the Sales Department, where the information was posted on a duplicate of the dealer's sales progress card. Our copy of the sales progress, together with the original field survey card, was kept in a prospect Kardex file. Office control of prospects assigned, reports due, and sales made, was facilitated by the use of a signal system applied to the visible margin of the field card.

The main principle in guiding our procedure of releasing prospects was to obtain a reasonable control over their development with a minimum of clerical work for the dealer and ourselves. We endeavored to make it easy for the dealer to give us the control we thought necessary. One clerk was sufficient to handle the prospect file and the punch card machine.

Sales Results

A complete analysis has been made of the sales results obtained from this survey. From the 10,000 consumers contacted, 863 prospects for new appliances were secured. All of these prospects were considered good and were released to dealers.

Out of the 863 prospects, dealers reported 184 sales, giving a return of 21.3 per cent. These prospects have had an average time of 3½ months for culmination into sales. It is necessary to place a reasonable limit on the time for development when considering results of the activity. No knowledge is had, of course, of the prospects who purchased appliances from some other source after the dealer to whom they were assigned had been unsuccessful in making a sale. It is felt that 21.3 per cent is a creditable showing and indicates that the prospects were well qualified before being eligible for release. We feel that this is a genuine and tangible benefit to those

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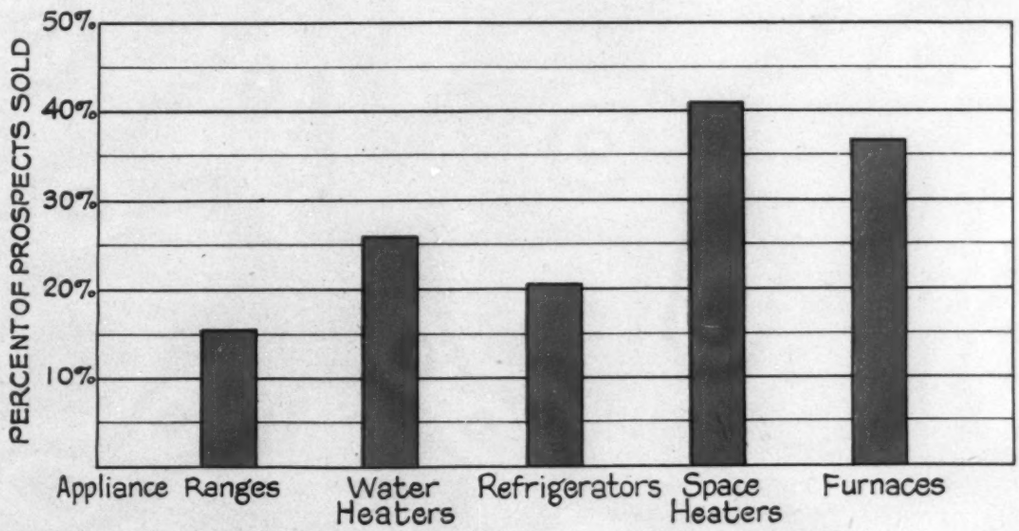
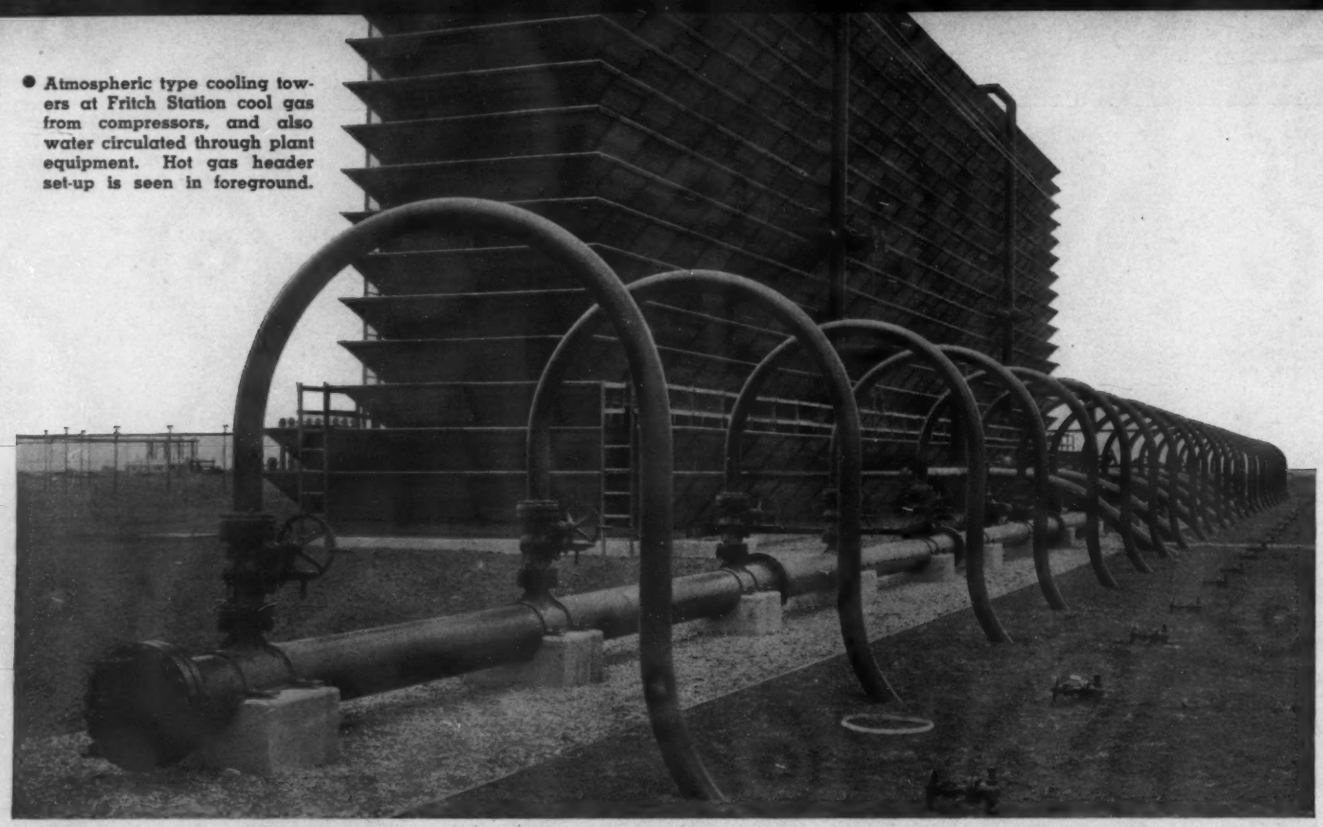


FIG. 5. PERCENTAGE OF PROSPECTS SOLD FOR EACH APPLIANCE



● Atmospheric type cooling towers at Fritch Station cool gas from compressors, and also water circulated through plant equipment. Hot gas header set-up is seen in foreground.

TEXOMA'S STATION No. 1

Exemplary Design Incorporated in Fritch Plant; Daily Capacity 204 MM Cubic Feet

IN THE Texas Panhandle about 38 miles north and slightly to the east of Amarillo, at the small settlement of Fritch, is situated one of the largest natural gas compressor stations in existence. This is Texoma Natural Gas Co's. Station No. 1, which in conjunction with nine additional stations operated by the Natural Gas Pipeline Co. of America, supplies natural gas to Chicago and other cities and towns enroute.

Built in 1931, the plant includes gasoline extraction facilities and gas dehydrating equipment which removes water vapors which would otherwise condense in the pipeline system. The practice of dehydrating natural gas is relatively new and this installation probably represents the first large commercial installation of its kind ever constructed. Rail facilities of the C. R. I. & P. serve the plant which is centrally situated in the vast Texas Panhandle gas field, from which all requirements are obtained through gathering lines extending into Moore, Hutchinson, Carson and Gray Counties. Originally designed to market 175,000,000 cubic feet per day, the plant was enlarged late last year by the addition of three large compressor units, increasing this figure to 204,000,000 cubic feet.

Three 24-inch main gathering lines which extend into three general areas of the field bring gas into the station, where it is first thoroughly scrubbed for the removal of dirt, condensate and other harmful materials before entering the compressing equipment.

Main Building

The main building is 68 feet wide by 448 feet long, housing fifteen 24- by 36-inch—1300 I.C. H.P. double-acting twin tandem gas engines driving 12⅝- by 36-inch double-acting compressor cylinders, and the concrete foundation for unit number 16. This impressive array of engines aggregates 19,500 I.C. H.P. at present and when the 16th unit is installed, the total will be 20,800. Perhaps a better idea of the unusual size of this engine room may be gained by a few figures. Each of the main units weighs 196 tons, the total weight of 15 units aggregates 2,940 tons; 105 freight cars were required to transport them from the factory. An electric signaling system has been provided to direct the engineer on duty to any point in the building where he may be needed in case of trouble, which is important because of the great length of the structure.

Speed is essential when repairs are required and to serve this end, four 10-ton traveling cranes are provided, two on each side of the building, which is of the center column type.

Fluctuating pressures from one section of the field made it advisable to install unloader pockets in the outboard heads of five units and these have materially assisted in the prevention of engine overloads.

Gas from the compressors is piped to tubular cooling sections which are placed in the lower portions of two atmospheric type cooling towers, where the heat of compression is removed before the gas enters the 24-inch station discharge line.

These two towers perform the double duty of cooling the gas and all of the water circulated through the plant equipment. Severe dust storms which have increased greatly in frequency and intensity during the past two years, are creating a real problem since the cooling towers trap an enormous quantity of dirt which is not easily removed from the water system. The dust is also a menace to plant machinery and efforts are being made to perfect an air filtration and ventilating system which will exclude dust from the buildings and create better working conditions for the operators.

Auxiliary Equipment

The principal auxiliary machinery is housed in a building 36 feet wide by 126 feet long and a brief description may be of interest. Three 420 H.P. 6-cylinder vertical gas engines direct connected to 280 K.W. 3-phase 60-cycle 2300-volt A.C. generators supply all electric energy required in the compressor station and gasoline plant for the operation of pumps, air compressors, machine shop tools, and other equipment, and also furnish light for the entire property. Two 8- by 4½- by 8-inch air compressors are used for starting all engines and for general air requirements. A feature which is quite unusual in compressor station design is found in the water pumping equipment which is installed in the building basement. This is a 260 H.P. high pressure gas turbine running at 4000 r.p.m., driving two, 6000 g.p.m. centrifugal pumps in tandem, through a set of reduction gears. The gas used by this machine is exhausted directly into the plant fuel system, and the quantity is sufficient to supply the normal load requirements. During peak loads, when a maximum number of engines are running, extra fuel is automatically fed into the fuel system from the regulator house, which is of conventional design. These regulators are capable of assuming the plant load the instant anything should interfere with the normal functioning of the turbine unit. Four more centrifugal pumps, each having a capacity of 4000 g.p.m. and each driven by a 100 H.P. electric motor, are used chiefly for stand-by service. Ignition for the main engines is provided by two 1½ K.W. motor generator sets and a group of wet batteries arranged to float on the line, thus providing ample flexibility and protection for this very important facility. An innovation at this plant is embodied in the ignition circuits which are wired to prevent electrolytic action from taking place in the piping system, due to stray currents which are normally prevalent in the customary system of wiring. Although the machine shop equipment is by no means complete, sufficient tools are installed to carry on normal repair work. These include two lathes, two drill presses, grinder and power saw, all machines being driven by individual electric motors. The auxiliary building also houses a complete tool room and a wash and locker room for the plant personnel.

Residue cooling water from the engine exhausts and rain water from the roofs of the main and auxiliary buildings is gathered in a concrete sump from which it is automatically pumped into the plant water system or to waste as desired.

Warm water from the engine and compressor jackets gravitates into a 30- by 50-foot concrete hot well from which it is pumped over the cooling towers. From the cooling tower basins it is recirculated through the cooling system with a 100,000-gallon elevated tank floating on the discharge line, thus providing emergency protection for a time in case of temporary difficulty with the pumping equipment. This elevated tank also provides pressure for the fire protection and irrigation systems.

Lubricating oils are brought in by tank cars, and unloaded into two 8,000-gallon storage tanks. For the accommodation of company automobiles and the housing of station materials, a combination garage and warehouse building has been provided. Situated near the plant entrance is the office building where recording pressure gauges are placed and a telephone switchboard is installed. The company has a private telephone system reaching from Chicago to Amarillo, where offices are maintained and all operating points between these cities are connected with it. This switchboard is the clearing point for all calls in and out of the gas production area, the station system and the Amarillo gas production office with the main line. Hourly operating control of the entire pipeline system is accurately maintained through this facility from the dispatcher's office in Chicago.

Water Supply

With the exception of water supply, the plant is entirely independent of outside support in respect to utilities. Underground water supplies are very limited in this area and river water, which is not far distant, is so turbid that it cannot be satisfactorily used. A private company, however, has developed an extensive water system in the field and all plant requirements are purchased from this concern. Current requirements are stored in a 55,000-barrel tank which is kept constantly filled for protection against possible temporary failures of the water supply. From this tank make-up the requirement is withdrawn and pumped through a zeolite softener located in the gasoline plant boiler house from which it is delivered to the plant and domestic systems. Very careful and frequent checks are maintained on the quality of water used for domestic consumption and during the summer months light chlorinization is practiced as a matter of safety.

The entire station is heated by steam supplied by the gasoline plant boilers,

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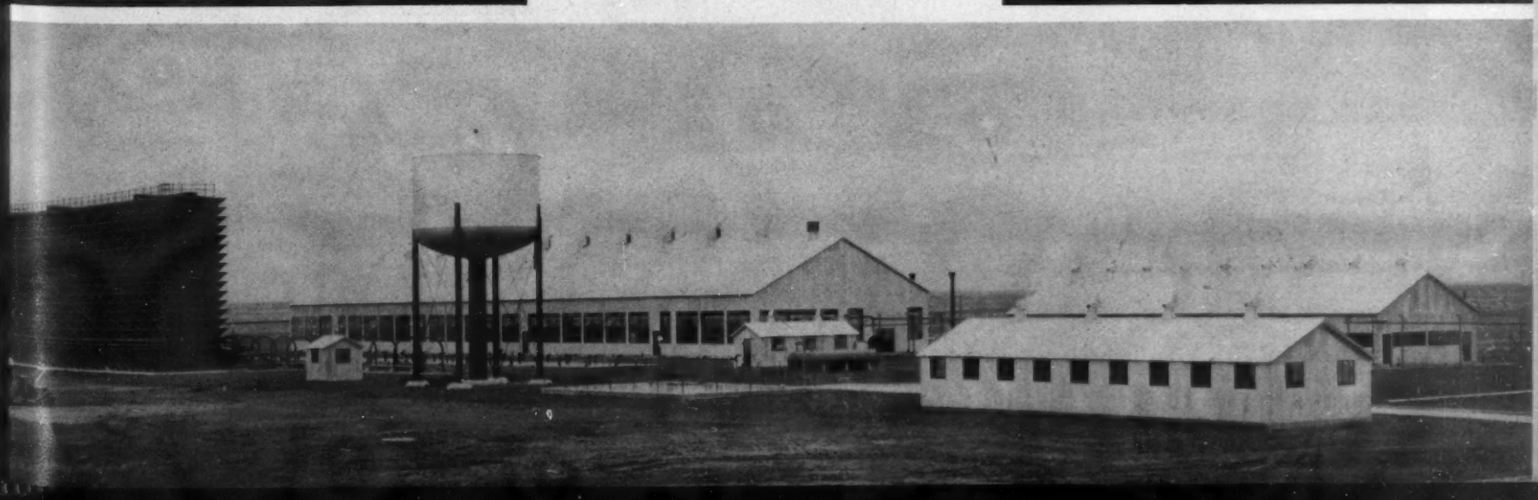


● Overall view of Texoma's Station No. 1, one of 10 stations pumping Texas gas to Chicago and towns en route.

Dissimilar Metal Corrosion

THE authors' company is using copper pipe in large quantities in its underground distributing systems, where it is brazed to steel pipe at many points. The possibility that the use of copper pipe connected to steel might accelerate the corrosion of the steel, because of the electromotive force produced by these two metals, was recognized at the outset, and an investigation was made then to determine if corrosion from this source might be serious.

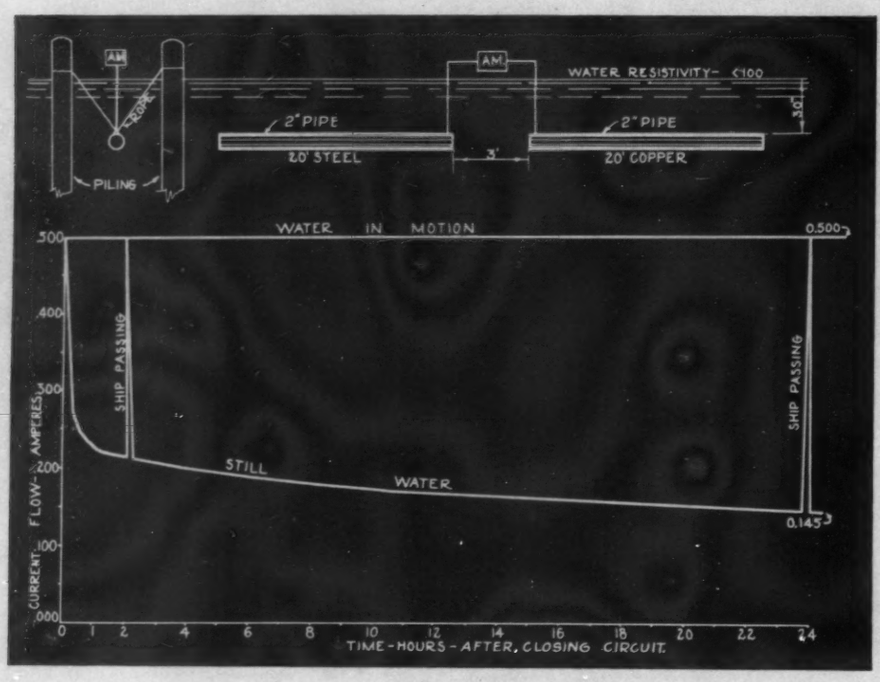


FIG. 1.

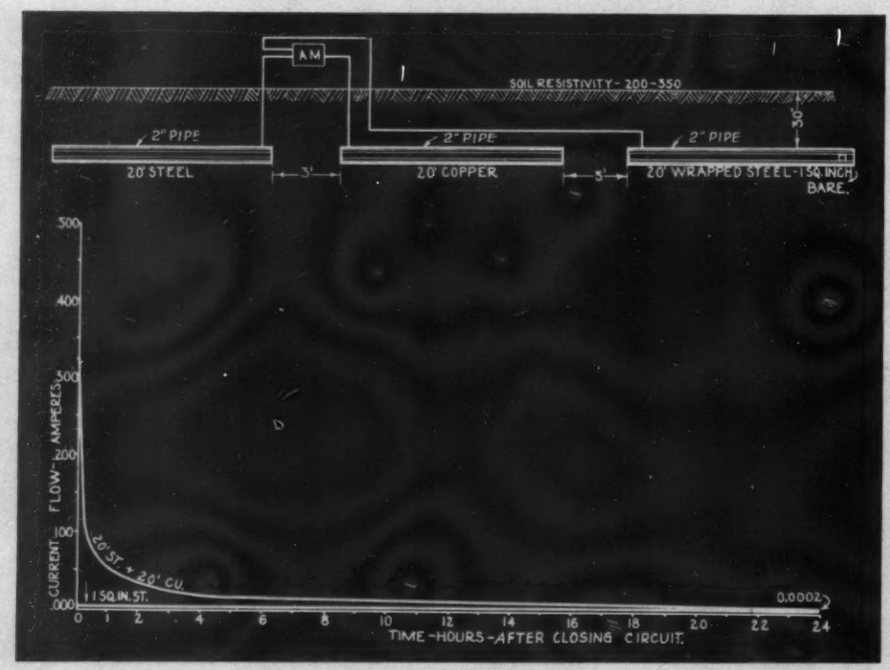


FIG. 2.

That investigation consisted of an inspection of the steel pipe near brazed joints and near brass and bronze valves and cocks that had been buried for a number of years in corrosive Southern California soils. It led to the following conclusions:

(1) In some soils no appreciable corrosion of steel in contact with brass or bronze occurs.

(2) In other soils accelerated corrosion of the steel does occur but the corrosion is confined to the area adjacent to the copper alloy. The corroded area rarely if ever extends for a distance of more than 3 inches from the copper-alloy-steel junction.

(3) If the copper alloy and steel surfaces can be separated in effect by applying a protective coating to the steel surrounding the junction, it is probable that no corrosion of importance will result from the use of dissimilar metals.

As a result of this investigation we adopted the practice of applying a protective coating at all copper-steel junctions so that the shortest distance through the soil from a bare copper surface to a steel surface is in all cases at least 3 feet.

This practice has proven quite satisfactory. We have yet to find any corrosion of our steel pipe that we suspect might have been caused or accelerated appreciably by our use of copper.

However, as our use of copper continues, cases arise where the area of copper exposed to soil equals or exceeds the area of steel exposed in the vicinity. These relative areas of copper and steel are very different from those examined during our original investigation. Therefore the present investigation was started to determine if possible if a copper pipe having a large external surface, connected to a steel pipe having an equal or less surface area, might cause corrosion that would shorten the useful life of the steel pipe.

The experiments described herein do not definitely settle this question, but they do throw some light on the subject, and help one to understand the important factors involved.

Description of Tests

The experimental set-ups used in the first series of tests are shown in Figs.

in Soils

By F. A. HOUGH
and A. B. ALLYNE

Southern Counties Gas Company
of California*

1, 2, and 3. Fig. 1 shows the tests conducted in the Los Angeles Harbor channel; Fig. 2 illustrates the set-up in a soil at Venice; and Fig. 3, another soil test at Wintersburg.

The set-ups were designed to give a galvanic cell having the same geometrical arrangement and resistance as those actually existing in our distribution system. Standard 2-inch pipe was used for the electrodes. The arrangement makes possible the measuring of the current flowing in the circuit, thus giving a direct measure of the rate of corrosion produced by the cells.

F. A. HOUGH

A. B. ALLYNE

The current measurements taken during this series of tests are shown in Figs. 1, 2, and 3, and estimates of the rates of corrosion produced by these currents are given in Table No. 1.

This series illustrates in a striking manner the great importance of polarization in retarding the corrosive action of dissimilar metals in soils.

In the Venice test the initial current when the cell was unpolarized was .320 amperes, but after polarization this current dropped to 0.0002 amperes.

This series also demonstrates that conclusions concerning dissimilar metal corrosion in soils cannot be drawn from experiences with dissimilar metals in contact with salt water in motion. In the test conducted in sea water no diminution of current occurred as long as relative motion of the salt water and the copper cathode continued.

Table No. 1, Column (9) shows the residual potential differences existing between the copper and steel. The surprising difference in the residual potential difference between copper and steel found in the Venice tests and the residual potential difference found in the Wintersburg tests shows that care must be taken in drawing general conclusions from the results of a few experiments. We did not attempt to determine to what properties of the two soils these differences can be attributed.

It is difficult to judge the importance of the corrosion that would result from the currents measured in this series of tests. It is evident from Table No. 1 that the corrosion produced by dissimilar metals in the Venice soil is negligible. We cannot be so sure, however, concerning the Wintersburg soil. The residual current that flowed between a 150-foot length of 2-inch copper pipe and a 20-foot length of 2-inch bare steel pipe would perforate a 2-inch steel pipe in a little more than 100 years, *provided the depth of corrosion were uniform over the entire surface of the steel.* As the steel electrode was reduced in area to that of a 2-foot length of 2-inch pipe and then to that of a 1-inch cap (0.055 sq. ft.), the rate of penetration estimated by means of the measured flow of current increased. The rate based on the 1-inch cap test would perforate a 2-inch steel pipe in approximately 10 years.

These results check our actual experience in that we have observed no serious corrosion of steel mains connected to copper mains, but have observed rapid corrosion of iron fittings connected to large surfaces of copper pipe.

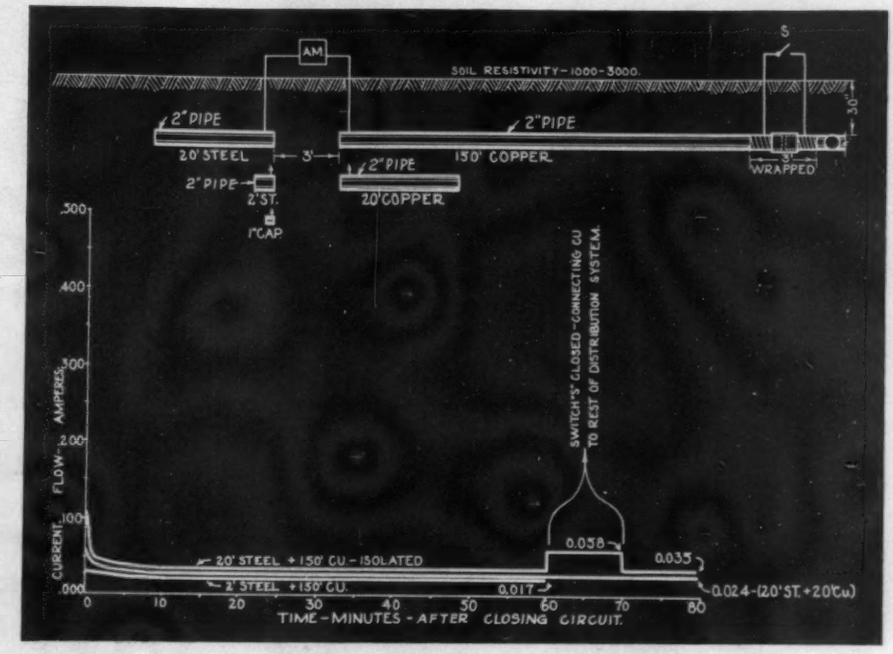


FIG. 3.

Frequently we have steel pipe protected throughout its length with a protective coating having a high electrical resistance and connected to a copper pipe. The question then arises as to whether or not the copper will produce accelerated corrosion of the steel at pin holes and small breaks in the coating. We tried, but because of the lack of sensitivity of our available electrical instruments, were not able to measure the current flowing to such pin holes or breaks.

Some idea concerning the probable importance of any such "pitting" action can be gained from a comparison of the potential differences and circuit resistance involved in ordinary soil corrosion with the potential differences and circuit resistances involved in dissimilar metal corrosion. Chemists who have specialized in corrosion problems now generally agree that most of the corrosion of steel by soils can be satisfactorily explained by the theory that such corrosion is produced by oxygen concentration galvanic cells. Differences of potential between adjacent areas on a steel surface are produced by differences in oxygen concentration at the surfaces of the two areas. Areas where the oxygen concentration is low are positive to those where the oxygen concentration is high. Pitting is explained by this theory by saying that within the pit the oxygen concentration is lower than it is on the surface surrounding the pit; consequently the metal in the pit is positive to the metal surrounding it and current flows from the metal in the pit into the soil and then back onto the surrounding metal, taking metal from the interior of

*Presented before the Technical Section Spring Conference, Pacific Coast Gas Association, Los Angeles, Calif., March 26-27, 1936.

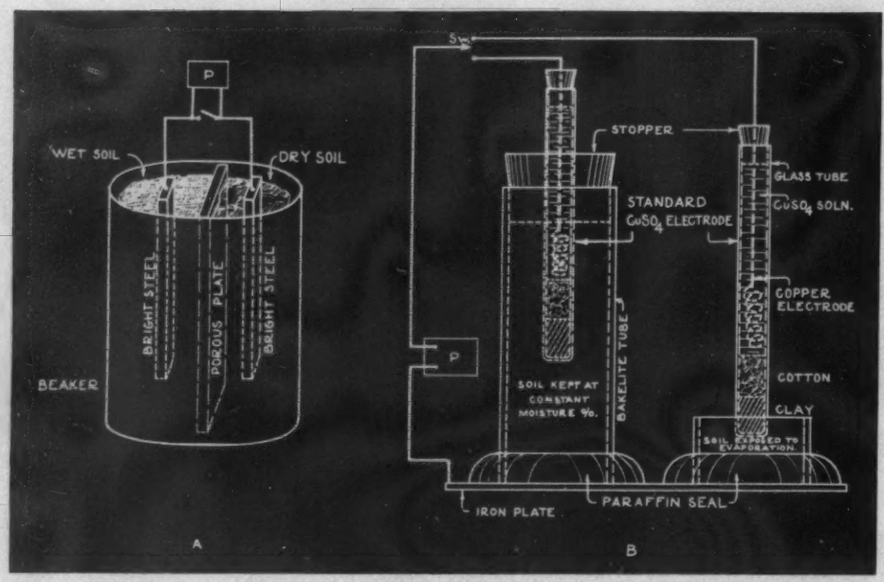


FIG. 4.

the pit and cathodically protecting the surrounding metal. Differences in the oxygen concentration on steel surfaces buried in soil may be caused by differences in soil texture or moisture content, the concentration being high where the soil is dry or granular in texture and low where the soil is wet or thoroughly compacted.

Numerous investigators have devised laboratory experiments to demonstrate that differences in oxygen concentration on a steel surface produce differences of potentials. A clever and convincing series of experiments made to determine the magnitude of the potential differences produced by differences in the moisture content and texture of soil is reported by E. R. Shepard.[1] One of these tests demonstrated the effect produced when a portion of a pipe surface is in contact with wet tightly-compacted soil and an adjacent portion is in contact with loose granular soil of the same kind. The apparatus used is shown in Fig. 4 (a) and the experiment is described by Shepard as follows:

"A 100-cc. beaker was divided vertically by a porous partition, and a bright steel plate placed in each of the compartments thus formed. In one side, A, was placed a sample of Fargo clay loam which had been mixed with water to the condition of a heavy paste. The other side, B, was filled with the same soil in a dry and granular form, over which water was slowly poured to bring it to a moist but not a saturated condition."

The initial open circuit potential of this cell was 0.2 volts and when the cell was first short-circuited a current of .5 milliamperes flowed in the direction to corrode the electrode in the wet compacted soil. After being short-circuited for 23 days the current was .12 milliamperes and the open circuit potential of the cell was .04 volts.

In another of Shepard's experiments he demonstrated the electrical effect produced by the gradual drying of a portion of wet soil in contact with a steel surface. The apparatus used is shown in Fig. 4 (b). He describes the experiment as follows:

"Two similar samples of each of five soils were packed into Bakelite tubes 2.54 cm. (1 inch) in diameter. One tube was 7.6 cm. (3 inches) long and the other 1.9 cm. (0.75 inch) long. The longer tube was closed at the top with a stopper and the short tube left exposed to evaporation. The five pairs of samples thus prepared were placed on a clean sheet of steel. Hot paraffin was flowed around the bottom of each tube to insure a definite and permanent contact and to prevent evaporation from the bottom. As a standard electrode to which the steel plate in contact with each soil sample could be referred, a copper electrode in the presence of a concentrated solution of copper sulfate was used. The potential difference between the steel plate and the copper electrode, when placed successively in each soil sample, was measured with a potentiometer at intervals over a period of 7 days."

The results of the experiment can be summarized as follows:

(1) Some Factors Involved in Soil Corrosion. E. R. Shepard. Industrial and Engineering Chemistry, Vol. 26, Page 723, July 1934.

TABLE NO. 1. RESULTS OF FIELD TESTS.

Test Location	Test in Salt Water or Soil	Length of 2-In. Copper Pipe Used for Cathode (Feet)	Surface Area of Copper Cathode (Sq. Ft.)	Length of 2-In. Steel Pipe Used for Anode (Feet)	Surface Area of Steel Anode (Sq. Ft.)	Initial Current Flow Between Copper and Steel (Amperes)	Residual Current Flow Between Copper and Steel (Amperes)	Residual Potential Difference Measured Between Copper and Steel (Volts)	Computed Rate of Penetration of Steel, Based on Residual Current Flow Values (Inches per Year)*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
San Pedro	Salt Water (In motion)	20	12.47	20	12.47	0.500	0.500	0.400	0.01955
Venice	Soil	20	12.47	20	12.47	0.320	0.0002	0.005	0.0000078
Wintersburg	Soil	20	12.47	20	12.47	0.060	0.024	0.200	0.00094
Wintersburg	Soil	150	93.40	20	12.47	0.076	0.035	0.200	0.00136
Wintersburg	Soil	150	93.40	2	1.25	0.030	0.017	0.200	0.0067
Wintersburg	Soil	150	93.40	A 1-in. cap	0.055	0.0017	0.0017		0.0152

*Computations are based on the assumption that 20.1 pounds of steel are removed per ampere year and that depth of penetration is uniform over the exposed area. This latter assumption does not fit the facts, of course. We do not yet have experimental data to show what pitting factor should be used under our test conditions.

Soil	Potential difference at start of Test (Volts)	Potential difference after 7 Days (Volts)
Merced silt loam	0.003	0.645
Miller clay	0.109	0.826
Ramona loam	0.006	0.705
Susquehanna clay	0.001	0.656
Unidentified silt loam	0.009	0.915

Thus we see that a difference in the moisture content of a soil can produce a potential difference as great or greater than the open circuit potential difference between unpolarized copper and steel.

This difference in potential produced by differences in moisture content probably explains the tendency often observed for pipe lines to corrode more rapidly on the bottom than on the top.

The electrical resistance of the galvanic circuits is as important as the potential in determining how much current will flow. Since in our practice the pipe is always coated at the junction of a copper and steel surface and for a distance of at least 3 feet from the junction, there is an important difference in the resistance of the dissimilar metal galvanic circuits which we set up and the resistance of the oxygen concentration cells that produce common soil corrosion.

Shepard devised a method for measuring the resistance of an electrical circuit similar to those that produce pitting. The apparatus he used is shown in Fig. 5 (a). In this experiment two thin steel plates were placed one above the other with a piece of paper between to insulate one from the other. A hole having a diameter about equal to that of a pit (.22-inch for example) passed through the upper plate and the paper. Soil was forced into this hole and piled on the upper plate. A battery was connected to the two plates so that positive current flowed from the lower plate into the soil in the pit hole, then through the soil to the upper plate. The geometrical arrangement and length of the path the current takes through the soil in this experiment are the same as the path taken through the soil by the current flowing from a pit.

Shepard made resistance measurements by this method for a range of pit diameters and for a range of soil resistances, and showed that the current density in the pit obtained in such an experiment can be computed by the equation—

$$i = \frac{3{,}950{,}000\ E}{r}$$

Where

i = current density in milliamperes per square foot

E = potential difference between plates (volts)

r = specific resistance of soil (ohm-cms.)

We conducted a similar series of tests with the apparatus arranged to give a current path through the soil similar to the path the current produced by dissimilar metals would take if a small pin hole should exist in the protective coating near a junction of copper and steel in our distribution systems. The arrangement used is shown in Fig. 5 (b). The resistance obtained in these experiments for a pit .22-inch in diameter are given in Table No. 2 and compared there with Shepard's results.

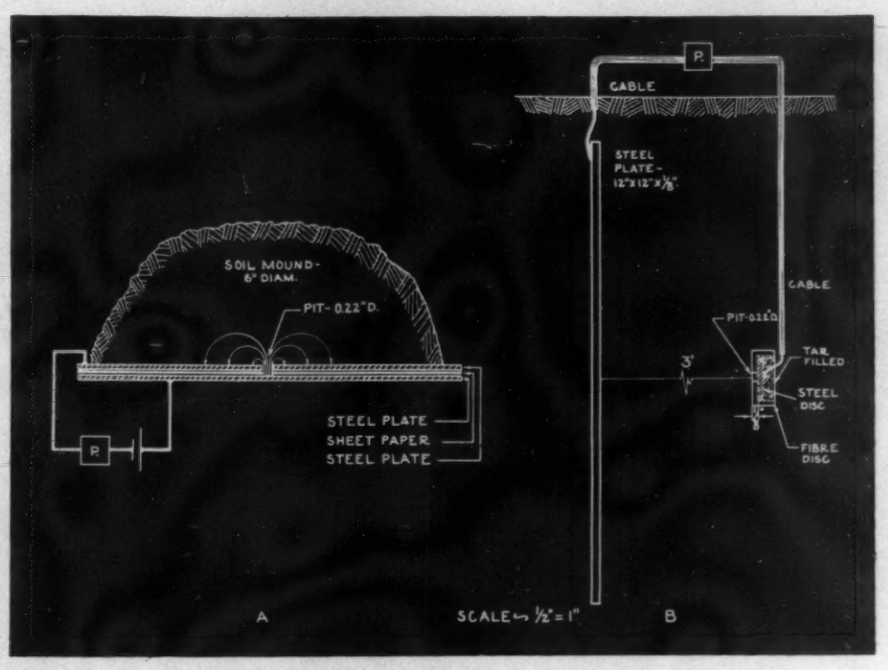


FIG. 5.

It appears from these resistance measurements that under our conditions the residual e.m.f. of a dissimilar metal galvanic cell has to be from five to seven times the e.m.f. of the oxygen concentration cells that produce ordinary soil corrosion, to produce the same rate of penetration. Shepard's experiments show that it is possible to obtain potential differences with oxygen concentration cells that are as high or higher than those produced by copper-iron cells. He does not show, however, whether the electromotive forces he measured are typical of those to be found in actual practice in the field or whether they are extreme values that rarely exist in actual field installations. For this reason it is still impossible for us to draw from our work definite, general conclusions concerning the importance of dissimilar metal corrosion. Further experiments are now in progress that should eventually settle this question for the conditions under which we use copper and steel.

Summary

The field measurement of currents flowing in copper-steel galvanic cells that closely approximate the cells that exist in distribution systems containing both copper and steel, show that:

1. Polarization is much more effective in reducing current flow between dissimilar metals in soils than it is in reducing such flow in salt water in motion; therefore conclusions concerning

(Continued on Page 90)

TABLE NO. 2.

Soil Resistance (Ohm-cm.)	Pit-Circuit Resistance Computed by Shepard's Equation Fig. 5 (b) (Ohms)	Dissimilar Metal Circuit Resistance Measured Fig. 5 (a) (Ohms)	Ratio of Resistance of Our Dissimilar-Metal-Pit Circuit to Resistance of Pit Circuit Measured by Shepard
300	277	2,000	7.22
1,500	1,385	7,000	5.05
2,750	2,540	14,500	5.68

CENTENNIAL AT A GLANCE . . .

BIRD'S-EYE perspective of the Southwest's first World's Fair—a $25,000,000 spectacle opening on June 6 to continue to November 29. Buildings and exhibits at the Dallas Centennial site are rapidly approaching completion, and will add an interesting background for Natural Gas Department visitors.

LONE STAR'S GIFT . . .

L. B. DENNING, SR., A. G. A. head and Lone Star Gas Co. president, mans the concrete mixer to start pouring of concrete for foundations of the Hall of Religion on the Texas Centennial exposition grounds. Lone Star stockholders are donating the $50,000 edifice to the Centennial.

THE FIRST 20 MILLION YEARS (IN 20 MINUTES) . . .

BELOW ARE a number of scenes which the Dallas conventioneer will witness again in a 20-minute sound-motion picture produced by gas companies of Southern California—to be exhibited during the Dallas natural gas meetings. Entitled "The First 20 Million Years", the picture takes natural gas from its early-geologic origins down to use in the modern home and factory. Except for professional services in photography and sound announcing it is the product of gas company talent. Douglas A. Buckler of Southern California Gas Co. wrote the scenario, and also the lecture which was transcribed on the film for sound projection. Photography was supervised by Fred Champion of Southern Counties Gas Co., 20-mm. film being used. Wilfred Lucas, radio announcer and motion picture character actor, did the talking. (Illustration courtesy of Southern California Gas Co.)

DALLAS .. .. PREVIEW

Historic Texas Setting for May 5-8 Sessions of Natural Gas Department

HOST COMPANY HEADQUARTERS

DALLAS GAS CO., with R. G. Soper—arrangements chairman for the natural gas meetings—at the helm as president, gives its city 100 per cent natural gas service to make it one of the most delightful communities in the whole Southwest. Dallas, a city of 300,000, stands 13th in the nation in point of wholesale business volume. It has had natural gas since 1910, brought through lines of its parent company, Lone Star Gas Co. Seen above is the 14-story Dallas Gas Building.

CHAIRMAN
(Wm. Moeller, Jr.)

VICE-CHAIRMAN
(Geo. E. Welker)

SECRETARY
(A. E. Higgins)

ARRANGEMENTS
(R. G. Soper)

CONVENTION SCENE-SHIFTERS . . .

ON THE SPOT to render service at Dallas are a group of capable Department officials and Convention Committeemen, a few of whom are shown on this page. Others in responsible posts are Geo. Martin, in charge of program arrangements, and B. R. Newberry, handling the entertainment committee assignment.

TECHNICAL CHR.
(H. C. Cooper)

PUBLICITY
(W. C. Grant)

RECEPTION
(C. K. Patton)

TRANSPORTATION
(L. B. Denning, Jr.)

NIGHT SKYLINE . . .

ARTIST visualizes how the Texas Centennial exposition will appear by night, in this view along the Esplanade of State. Immediate purpose of the Centennial is to commemorate 100 years of Texas independence as a republic and a state, but the exposition record will cover all of Texas' colorful history. Flags of six nations have flown over Texas soil, and the Centennial will bring something of each episode to the visitor.

DOMESTIC GAS APPLIANCE SALES—1935

Combined Sales of Gas Companies and Dealers

NOTE: Unit sales prices are on uninstalled basis unless otherwise indicated.

COMPANY	RANGES		HOT PLATES AND LAUNDRY STOVES		WATER HEATERS: AUTOMATIC		WATER HEATERS: NON-AUTOMATIC		REFRIGERATORS		SPACE HEATERS		FURNACES: CENTRAL AND UNIT		FURNACES: FLOOR		FURNACE CONVERSIONS		Number of Company Salesmen	Number of Dealer Contact Representatives	Number of Domestic Meters
	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price			
ALABAMA																					
Birmingham Gas Co.	925	$83			319	$74	13	$45	656	$202	1,006	$15	14	$250	4	$70	80	$115	17	1	37,335
ARIZONA																					
Central Arizona Light and Power Co., Phoenix[1]	799	50			646	45	251	13	90	175	1,459		74	100	368	70	165	75	9	1	11,444
The Tucson Gas, Electric Light & Power Co.	264	90	10	$15	317	60	43	20	40	200	987	20	128	175	37	100	52	125	3	2	5,437
ARKANSAS																					
Little Rock Gas & Fuel Co.[2]	611	76			582	52			445	208	642	16	6	480	109	80	1	90	8		29,647
CALIFORNIA																					
Coast Counties Gas and Electric Co., Santa Cruz	2,165	105	93	6	1,098	47	556	12	219	190	1,548	31	178	186	966	48	10	105	9		18,825
Los Angeles Gas and Electric Corp. Southern California Gas Co., Los Angeles.[3] Southern Counties Gas Co., Los Angeles	80,000	75	1,000		45,000	35					135,000	18	4,000	50	3,500	45					750,000
Pacific Gas and Electric Co., San Francisco	38,503	90			21,219	60	6,150	20	1,313	230	15,335	35	6,021	126	7,601	55	1,458	65	175	11	453,556
San Diego Consolidated Gas and Electric Co.[1]	4,100	70	25		3,250	50	1,475	20			3,595	18	239	350[4]	360	60[4]			4	2[5]	57,868
San Joaquin Light & Power Corp., Fresno[6]	4,840	80	[7]		1,017	50	330	25	275	250	1,881		118	300	622	40	25	80		9	30,954
COLORADO																					
Public Service Co. of Colorado, Denver[8]	2,500	75	200	5	3,000	65			200	225	1,200	30	325	170	75	68	400	75	61	3	72,250
Pueblo Gas and Fuel Co.	290	90	8	5	343	65	21	15	101	200	78	30	3	150	10	40	8	75	6		4,435
CONNECTICUT																					
The Connecticut Light and Power Co., Hartford	1,179	70			710	78	120	14	512	160	405[9]	60	76	175	[10]		[10]		26		57,832
The Hartford Gas Co.	1,927				763		116		555		35		8						16	1	51,341
DELAWARE																					
Delaware Power & Light Co., Wilmington	1,238	77	8		472	61	24	18	38	211	35		20	184			12	184	6		28,404
DISTRIC OF COLUMBIA																					
Washington Gas Light Co.[3]	10,113	55	336	10	7,435	50	190	15	2,638	153	287	94	2,071	215			485	149	28	8	135,186
GEORGIA																					
Savannah Gas Co.	810	75	20	550	150	75	30	20	148	220	365	10	1				1	67	6		11,367

[1] Average sales prices estimated.
[2] Figures include Arkansas towns served by Arkansas-Louisiana Gas Co.
[3] Pacific Lighting Corp. subsidiaries, totals combined due to overlapping service areas.
[4] Sales prices on installed basis.
[5] Company salesmen, part-time.
[6] Dealer sales only.
[7] Included under ranges.
[8] Dealer totals included are estimates.
[9] Kitchen heaters.
[10] Included under central and unit furnaces.

(Continued on Page 26)

PHOTOGRAPH COURTESY OF PORTLAND GAS & COKE COMPANY

LOAD-BUILDING ON 100 GAS SYSTEMS

by utility-dealer sales partnership reported in GAS' survey covering domestic appliances

By GEORGE H. FINLEY
Editor, GAS

BEGINNING on the preceding page of this issue, *GAS* publishes an array of domestic appliance sales figures which we believe readers will find exceedingly interesting. While approximate national sales totals have been available to the industry, they do not show trends in different sections of the country, nor do they show price tendencies in the various appliance classifications. The present survey, arranged by individual distributing company territories, is useful in both particulars.

Approximately 100 companies have contributed to the information here recorded. They represent some 8,655,000 meters—considerably above one-half of the industry's customers—and are reasonably representative of merchandising effort throughout the industry.

It should be noted that this survey, unlike previous appliance sales tabulations appearing in this journal, is a combination of company and dealer sales. In circulating requests for these sales totals, which involved records of dealer activity, the editors were frankly curious as to what information could be returned. The very general participation in this survey by companies from every section, clearly indicates that dealer cooperation has come a long way in the last few years. As recently as five years ago few gas companies could have offered even close estimates of how many appliances in each group were being put on their lines by dealers. Information on average price of dealer-sold appliances would have been even more difficult for utilities to produce. Generally speaking, companies did not appreciate as they now do the need for knowing what type of merchandise is going onto their lines through dealer channels; nor did they have the close relations with the dealer group necessary to yield this essential information. Certainly the current survey bears evidence to the progress which dealer cooperative activity has made in the gas industry.

Sufficient information is provided in the tabulation to give some insight into conditions governing the sales results shown. For example, the number of company salesmen and dealer contact representatives, reported by most of the companies, when checked with the number of meters on the esystem will give some clew to the "unit effort" being expended to do the sales job in each area. While the sales obtained per meter on the many systems are not strictly comparable in all respects, they are of inter-

(Continued on Page 66)

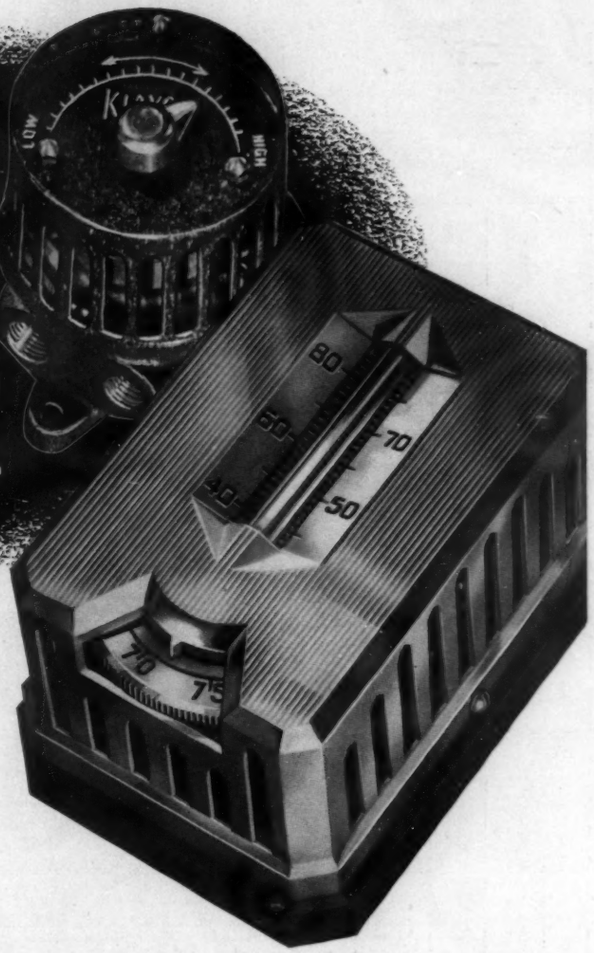
(Continued from Page 24)

COMPANY	RANGES		HOT PLATES AND LAUNDRY STOVES		WATER HEATERS: AUTOMATIC		WATER HEATERS: NON-AUTOMATIC		REFRIGERATORS		SPACE HEATERS		FURNACES: CENTRAL AND UNIT		FURNACES: FLOOR		FURNACE CONVERSIONS		Number of Company Salesmen	Number of Dealer Contact Representatives	Number of Domestic Meters
	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price			
ILLINOIS																					
Central Ill. Electric and Gas Co., Rockford	559	$66			618	$48			188	$156	51	$21					107	$218	7	27	30,000
Central Ill. Public Service Co., Springfield	838	70	[11]		353	60	25	$10	67	250	[11]		[11]		[11]		[11]		28		19,401
Public Service Co. of Northern Ill., Chicago[13]	1,579	80	74	$8	942	60	288	8	103	225	539[13]	60	330[13]	$400			583[13]	150	50	3	138,613
INDIANA																					
Gary Heat, Light & Water Co.	473	67			19		5	8	124	175	8	13							5		19,669
Public Service Co. of Indiana, Indianapolis[12]	1,355	65			474	75	25	11	75	174	23	19	18[36]		[10]		[10]				32,821
IOWA																					
Interstate Power Co., Dubuque	346		50		176		21		9		46		168[36]		[10]		[10]				14,000
Sioux City Gas & Electric Co.	2,090	95	1,333	6	388	39	323	16	55	200	12	20	25	400			51	135	5	2	17,627
KANSAS																					
Union Gas System, Inc., Independence	234	80			161	60			433	225	334	30	22	300	94	$75	16	100	12		12,000
LOUISIANA																					
New Orleans Public Service Inc.	8,429	50	645	8	1,940	70	199	20	592	225	11,490	6	[11]		[11]		[11]		41[14]	4[14]	71,822
MAINE																					
Portland Gas Light Co.	792	53	55	5	271	24	146	10	294	172	25	22	5		13		32	150	10		14,562
MASSACHUSETTS																					
Cambridge Gas Light Co.	488	60			136	100	93	18	259	150	3	15	12	400	15	50	50	180	6	1	24,000
MICHIGAN																					
Consumers Power Co., Jackson (8 gas divisions)	12,264				2,248				536				206				673	150[4]		15[15]	160,318
MINNESOTA																					
Minneapolis Gas Light Co.	1,500	80	200	10	1,200	70	300	22	1,010	180	150	25	110	300			709	200	48	1[15]	118,000
Montana-Dakota Utilities Co., Minneapolis[8]	3,042	70	585	7	1,069	45	958	13	646	164	4,389	30	226	245	571	63	699	45	24	3	16,500
Northern States Power Co., Minneapolis[12]	1,620	72	113	7	356	83	635	10	162	180	27	15	215[36]		[10]		[10]				104,854
MISSOURI																					
The Gas Service Co. Group, Kansas City	5,643		220		6,730						6,404		1,474				1,583[16]		120		234,784
Kansas City Gas Co.[12]	1,542	75			2,323[16]						767[16]		472[17]				721		40		86,340
St. Louis County Gas Co., Webster Groves[9]	1,500	80	200	5	1,000[18]	50	300	5	100	240	100	10	478	300			200	130	25	1	41,250
MONTANA																					
The Montana Power Co., Butte[12]	530		64		12		291		1		270		160		[19]		10		16		12,025
NEBRASKA																					
Iowa-Nebraska Light & Power Co., Lincoln	2,500	60	500	7	700	45	500	8	220	235	1,000	35	200	275			650	75	27		29,800
Northern Natural Gas Co., Omaha	834	60	300	5	772	45	315	13	18	225	1,800	35	94	200	25	45	912	60	3		16,603
NEW HAMPSHIRE																					
Manchester Gas Co.	254	71	19	4	74	58	17	14	175	131									4		11,823
NEW JERSEY																					
Atlantic City Gas Co.	766	59	14	6	61	55	43	8	154	163	30	18	4	200			4	155	10		21,353
Cumberland County Gas Co., Millville	160	65			22	38	17	10	6	171											10,279
Elizabethtown Consolidated Gas Co., Elizabeth	1,202	67	15		275	65	91	8	507	175	45	15	4	400			20	150	9	1	58,000

[4] Sales prices on installed basis.
[8] Dealer totals included are estimates.
[10] Included under central and unit furnaces.
[11] Sales figures not available.
[12] Company sales only.
[13] House-heating equipment listed (1452 total) represents 275 sales and 1177 rental-purchase installations.
[14] Combination gas and electric, devoting 25 per cent of time to gas.
[15] Part-time.
[16] Includes both sales and rentals.
[17] Includes unit heater sales and rentals.
[18] Including conversions.
[19] Included under space heaters.
[36] Furnace and conversion burner sales combined.

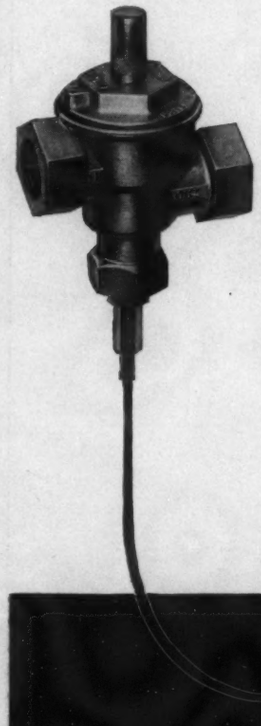
(Continued on Page 28)

New ALL GAS REMOTE CONTROL



FOR GAS-FIRED HEATING APPLIANCES

Here is the thermostat for gas-fired space or control heaters that gas men have always wanted. This Klixon Thermostat is **gas actuated**—no electric wiring—your own organization can service it without difficulty. And it provides the accurate room temperature control that meets the demands of today's market **in every respect.**



Klixon all-gas thermostats are snap-acting. They are controlled by the famous Spencer disc — a super sensitive corrugated disc that snaps into concave or convex shapes at predetermined temperatures. This disc turns on or off bleeder and main valves —makes the heater automatic.

Klixon controls can be built-in to your product at low cost. The thermostat is attractive, compact and easy to install. Send for complete information.

The Klixon Line of Gas Controls Is Complete

For complete and safe operation Spencer provides Automatic Pilot Shut-off Valves to be used with these new room thermostats.

The Spencer B2501 Automatic Pilot Shut-off Valve shown on the left gives absolute safety in lighting and operation. This shut-off valve provides:

1. Full safety regardless of sequence of lighting.
2. Safe failure in case thermal element is damaged.
3. Shut off of all gas including pilot on ignition failure.

Klixon also manufactures a complete line of electrical thermostats for heating and cooling appliances.

Send for bulletins.

SPENCER THERMOSTAT COMPANY **KLIXON** TRADE MARK REG U.S PAT OFF ATTLEBORO, MASS.

(Continued from Page 26)

COMPANY	RANGES		HOT PLATES AND LAUNDRY STOVES		WATER HEATERS: AUTOMATIC		WATER HEATERS: NON-AUTOMATIC		REFRIGERATORS		SPACE HEATERS		FURNACES: CENTRAL AND UNIT		FURNACES: FLOOR		FURNACE CONVERSIONS		Number of Company Salesmen	Number of Dealer Contact Representatives	Number of Domestic Meters
	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price			
NEW JERSEY (Continued)																					
Peoples Gas Co., Glassboro	1,135	$76	3	$10	24	$38	35	$14	172	$186	5	$15					3	$273	10		12,593
Public Service Electric and Gas Co., Newark [4] [12]	13,438	64	[7]		1,761	66	624	15	4,125	168	590		125	$252			554	252	174		649,632
NEW MEXICO																					
Albuquerque Gas & Electric Co.	195	86	19	9	233	55	39	16			241	19	13	303	125	$59	9	178	3		5,885
Southwestern Public Service Co., Roswell	227	75	47	3	114	50	50		85	225	233	25	10		40	100	5			1	2,100
NEW YORK																					
Brooklyn Borough Gas Co., Coney Island	1,529	51	1	8	122	75			970	165			22	214			2	171	5	[30]	70,000
The Brooklyn Union Gas Co.	12,426	54			974	83	15	13	8,628	170	256	26	60	277			56	190	61	[21]	677,664
Consolidated Edison Co. of New York Inc., New York	36,090	65	352	7	1,302	95	124	15	12,870	170	1,145	35	211				460	260	80	3	1,133,205
Empire Gas & Electric Co., Geneva [23]	1,715	85			780	60	210	20	178	160	243	15	172	300	[10]		818	180	41	6	25,443
Kings County Lighting Co., Brooklyn	2,655				81		7		3,079		19		15						8	[5]	97,886
Nassau & Suffolk Lighting Co., Mineola	737	62	5	9	154	70	4	13	79	200	18	65	21	335			8	155	11		29,462
New York Power and Light Corp., Albany [6]	4,508				3,653		954 [23]		47								175		25		112,609
Republic Light, Heat & Power Co., Inc., Buffalo [12]	944	80	26	5	448	55			226	225	364	40	28	350			201	125	19		37,834
Rochester Gas & Electric Corp.	836	82			855	54	79	19	231	185	135	15							30	1	92,000
OHIO																					
The Dayton Power and Light Co.	5,499		327		1,096	65			1,092		3,302		88	265			427	135	8	6	74,178
The East Ohio Gas Co., Cleveland	41,833				4,793 [24]	[12]			2,583		3,522		599				1,099				476,178
The Ohio Fuel Gas Co., Columbus	2,819	81			1,441	55			3,773	223	7,868		675 [25]	221			651	127	100		360,907
OKLAHOMA																					
Central States Power & Light Corp., Tulsa [6]	1,689	72	229	4	234	48	131	24	518	250	2,567		11	240	176	70	22			14	17,202
Oklahoma Natural Gas Co., Tulsa [6]	11,238	75	818	5	2,813	75	2,204	30	1,911	300	13,697	8	395	250	2,013	80	330	21		11	125,430
OREGON																					
Portland Gas & Coke Co.	5,229	94	612	7	2,030	83	1,531	13	928	184	860	30	233	275	39	62	672	98	72	6	75,346
PENNSYLVANIA																					
Equitable Sales Co., Pittsburgh	15,128	94	1,500	8	1,400	125	6,500	13	1,600	217	11,000	15	225	300	75	75	650	87	64	2	158,588
The Gas & Electric Appliance Co., Pittsburgh	1,735	98	25	3	493	59			1,936	218	3,731		155	130	266	157	584	104	100	25	250,000
The Harrisburg Gas Co.	818	70	25	5	454	75	72	25	292	225	30	15	2	125	1	145	2	175	8	1	32,000
Pennsylvania Gas & Electric Co., York [8]	789	72	29	5	402	60	15	10	137	200	30	15							4		15,272
Philadelphia Electric Co. [4] [13]	1,191	79			422 [16]	87	41	20	200	190	79	18	574 [16]	247			[10]		90	3	115,899
Scranton-Spring Brook Water Service Co., Scranton	1,156	73			159	54	32	16	258	168	47	37							12	6	25,276
RHODE ISLAND																					
Blackstone Valley Gas and Electric Co., Pawtucket	1,175	60	55	22	171	110	914	30	131	185	334	50 [4]	27	255 [4]			265	198 [4]	62	[15]	31,179

[4] Sales prices on installed basis.
[5] Company salesmen, part-time.
[6] Dealer sales only.
[7] Included under ranges.
[8] Dealer totals included are estimates.
[10] Included under central and unit furnaces.
[12] Company sales only.
[15] Part-time.
[16] Includes both sales and rentals.
[20] Plus monthly contact by field salesmen.
[21] Plus part-time contact by 30 district representatives (included under salesmen).
[23] Empire-New York Group of Associated Gas & Electric System.
[25] Includes 2,978 conversion automatics.
[24] Automatic and non-automatic, combined.
[25] Includes unit heater sales.

(Continued on Page 30)

NATIONAL ADS IN COLLIER'S, *the National Weekly* from ROBERTSHAW

A FLOOD OF NATION-WIDE PUBLICITY!

Your Tie-Up: **These mat ads to run in your paper—this tag to hang on your Robertshaw oven-heat-control-equipped gas ranges**

Here comes *action!* Here comes a merchandise Week, kindling a nation-wide interest in modern cookery—*as done on a Robertshaw oven-heat-control-equipped range.*

Here's your big chance to sell! Cash in on Measured-Cooking Week, backed by national advertising in Collier's, the National Weekly. YOU can create interest in your neighborhood by holding cooking classes—by running the mat ads shown above—supplied to you FREE. Write today for the complete plan.

You will get the same splendid service from ranges equipped with GRAYSON dials, made by a subsidiary of Robertshaw Thermostat Co.

ROBERTSHAW THERMOSTAT COMPANY
YOUNGWOOD, PENNA.

ROBERTSHAW OVEN-HEAT-CONTROL

(Continued from Page 28)

COMPANY	RANGES		HOT PLATES AND LAUNDRY STOVES		WATER HEATERS				REFRIGERATORS		SPACE HEATERS		FURNACES				FURNACE CONVERSIONS		Number of Company Salesmen	Number of Dealer Contact Representatives	Number of Domestic Meters
					AUTOMATIC		NON-AUTOMATIC						CENTRAL AND UNIT		FLOOR						
	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price	Number Sold	Unit Price			
SOUTH DAKOTA																					
Northwestern Public Service Co., Huron	661	$85			417	$50	187	$ 8	36	$160							87	$125	4		8,095
Sioux Falls Gas Co.	622	69	15	$ 8	241	70	7	15	128	194	89		122	$350	3	$75	136	130	7	7	7,300
TENNESSEE																					
Memphis Power & Light Co.	5,537	56	21	7	1,220	60	967	12	63[12]	250	11,509	$ 9	132	240	209	64	40	120	24	5	33,772
Nashville Gas & Heating Co.	1,380	74	30	6	150	60	210	15	149	160	400	9							10	1	14,000
TERRITORY OF HAWAII																					
Honolulu Gas Co., Ltd.	1,721	70	131	14	484	45			34	200									6	14	14,763
TEXAS																					
Community Natural Gas Co., Dallas	2,303	75			4,134	52			926	217	3,816	14	2	500	61	89	17	43	25		101,809
The Dallas Gas Co.[8]	2,551	80	100	8	674	50			636		1,894	20	85	400	414	75	12	125	11		65,000
Houston Gas and Fuel Co.	1,620	80	106	6	1,031	55			746	275	1,655	25	10[6]		100[6]		30[6]		12	1	46,465
Houston Natural Gas System (not including city of Houston)[1]	1,590	80	52		1,002	45	9		633	250	2,259	10	3							1	11,585
Lone Star Gas Co., Fort Worth Division	1,500	85	200	4	1,000	55			250	225	3,000	18	30	200	150	60	2	90	6		33,000
San Antonio Public Service Co.	1,350	60			675	45			360	200	1,500	13	14	350	39	50	9	75		1	47,389
Texas Cities Gas Co., Dallas	1,066	75			1,596	52			210	217	831	21	39	275	139	89	101	116	20		33,765
Texas Public Service Co., Austin	490	85			494	50			220	220	726	12	20	200	75	80	20	250	5		11,771
United Gas Public Service Co. & Subsidaries, Houston	10,078	77	87	10	5,702	50	256	10	2,420	237	12,270	20	15	175	360	90	19	90	50		110,562
UTAH																					
Mountain Fuel Supply Co., Salt Lake City	1,128				1,009		200		346		553		68		159		186		11		15,220
VIRGINIA																					
Richmond Department of Public Utilities[6]	1,200								25		115									2	29,795
Virginia Electric and Power Co., Norfolk[1]	601	60	30		274[16]	70	50	12	75	225	130	9							9		21,288
WASHINGTON																					
Northwest Cities Gas Co., Walla Walla[12]	358	85	50	8	245	65	68	15	47	140	37	30	21	225	2	100	4	85			6,140
Seattle Gas Co.[4]	1,270	93	90	10	1,411	78	80	23	120	180	180	42	25	304	49	137	224	134	32	1	36,172
Spokane Gas & Fuel Co.	350	60	54	7	119	55	71	20	22	235	17	16	1	200					4		5,848
Washington Gas & Electric Co., Tacoma	473	80	71	7	210	60	116	19	24	125	106	20	36[26]	175	[26]		[26]		6		11,014
WISCONSIN																					
Milwaukee Gas Light Co. and Associated Companies	3,016	77	204	8	282		1,022		760	145	8	30	2	115					50		168,438
Wisconsin Public Service Corp., Oshkosh	2,000	80	250	10	750	60	1,500	16	125	140	50	20	4	250					18	1	35,000
WYOMING																					
Northern Utilities Co., Casper	290		[7]		149[24]		[24]				229		105		[10]		54		4		6,353
The Rocky Mountain Gas Co., Casper	142	87	25	6	107	52	193	28	116	156	193	33	19	373	35	61	185	61			4,304

1 Average sales prices estimated.
4 Sales prices on installed basis.
6 Dealer sales only.
7 Included under ranges.
8 Dealer totals included are estimates.
10 Included under central and unit furnaces.
12 Company sales only.
16 Includes both sales and rentals.
24 Automatic and non-automatic, combined.
26 Furnace and conversion burner sales combined.

IMPORTANT

Announcement to the Gas Industry

★

New Wilcolator (*Type WW*) now gives you High-Low Oven Control

NOW you can meet competition on low temperature oven operation and still retain all of the advantages of the speed and economy of gas ranges. The New Wilcolator (Type WW) is the most outstanding contribution to the gas range industry since Wilcolator introduced the liquid type thermostat . . . the thermostat that created a new standard of gas range oven control.

QUICK FACTS ABOUT THE NEW WILCOLATOR (Type WW)

1. Throttling type thermostat operation at all temperatures . . . the accepted standard and safest method.
2. Low temperature oven operation to meet the entire demands of modern oven cookery.
3. Faster preheating.
4. Better broiler distribution.
5. Oven burners *never* thermostatically extinguish. This removes the hazard of burner back-fire and gas leakage due to a fouled valve.
6. No safety pilot required.
7. Thermostat and oven selector valve combined in one unit . . . simple to understand and operate.
8. Oven valve is of the PLUG type —the accepted construction of the gas industry for trouble-free operation.

The type WW Wilcolator eliminates the major advantage claimed by competitive fuels. For further details, write:

THE WILCOLATOR COMPANY, NEWARK, N. J.

WILCOLATOR

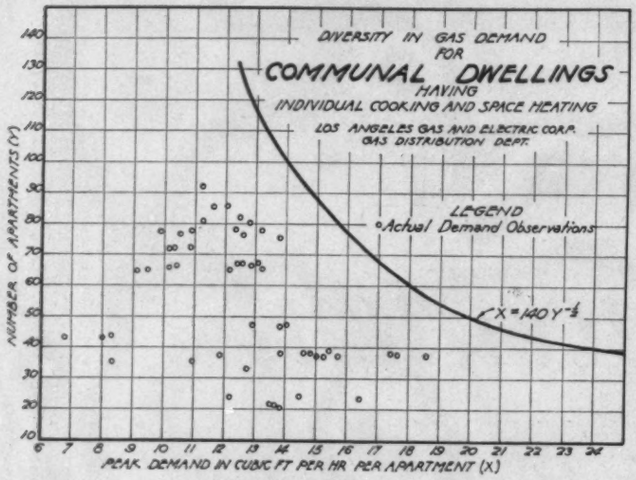

DIVERSITY IN GAS DEMAND FOR
COMMUNAL DWELLINGS
HAVING
INDIVIDUAL COOKING AND SPACE HEATING
LOS ANGELES GAS AND ELECTRIC CORP.
GAS DISTRIBUTION DEPT.
LEGEND
Actual Demand Observations
X = 140 Y^-1/2
NUMBER OF APARTMENTS (Y)
PEAK DEMAND IN CUBIC FT PER HR PER APARTMENT (X)

FIG. 1.

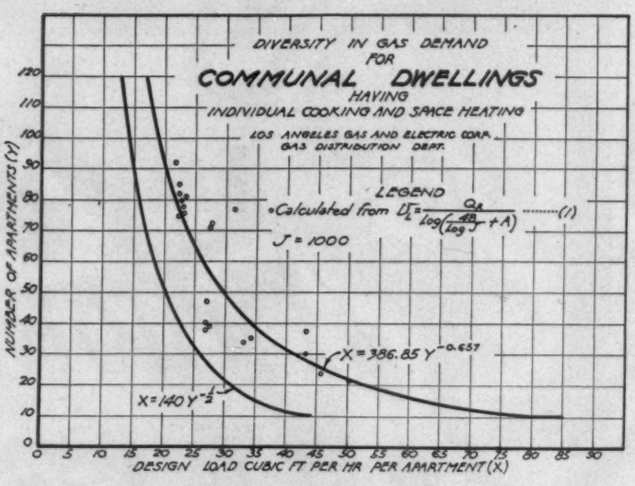


FIG. 2.

Effect of Diversity Upon Design of Apartment House Gas Systems

ESTIMATING the load which must be carried by the various units of the distribution system is no simple task, especially if diversity is to be taken advantage of to the fullest possible extent. The extent to which diversity affects the hourly demand was apparently first investigated [1] in 1928. It was shown by demand meter studies that while the highest possible load would result from the simultaneous operation of all the connected appliances at their fullest capacities, yet in actual practice the observed load seldom exceeded about 70 per cent of the rated connected load.

N. L. HOFF

The present author, in 1930, [2] suggested that problems in diversity might be solved by applying the theory of probabilities, and pointed out that such a solution would hold for both the case of individual demands as well as group demands. In 1931 [3] an equation was published, which was:

$$D_L = \frac{Q_R}{\text{Log}\left(\frac{48}{\text{Log J}} + A\right)} \quad \ldots\ldots\ldots (1)$$

where,

D_L = The design load in cubic feet per hour.

Q_R = The Rated Connected Load, cubic feet per hour.

● **N. L. HOFF, Los Angeles Gas and Electric Corp.: addressing Pacific Coast Gas Association Technical Section Spring Conference, Los Angeles, Calif., March 26-27, 1936—(Abstract by GAS)**

J = A factor of justifiable risk, varying from 100 to 1000.

A = The number of appliances for which Q_R is taken.

From time to time there have been published studies [4 5 6] which demonstrated that the foregoing equation is consistent with observed data, and that a reasonable safety factor is provided.

One of the fundamental assumptions in the derivation of Equation 1 was that it is equally likely that a gas consumer will use any of his appliances. In the average home, this assumption is reasonably sound, but in apartment houses or other types of communal dwellings it does not appear to be correct and leads to an unreasonably high safety factor in design, the reason being that families who live in apartments are usually required to accept the gas-burning equipment with which the apartment is equipped, whether or not it satisfactorily fulfills their requirements.

During the past three winters observations were taken on a number of apartment houses varying in size from 21 to 92 units, by observing the test hand of the master meter at each location. In every case the apartments had individual cooking and space heating appliances, and the water heating was of the central station type. Fig. 1 shows the wide dispersion in demand per apartment. It was frequently found that the demand varied over 100 per cent on successive days where the number of apartments occupied and the outside temperature remained approximately the same. This wide fluctuation demonstrates how much more erratic the apartment house load is compared with a similar number of individual residences.

The rated connected load and the number of appliances for each of the apartment houses studied was used to calculate the design loads in accordance with Equation 1. These design loads, divided by the number of apartments, have been plotted as shown in Fig. 2.

Plotting the data on log log coordinates shows that the relation is probably of the type which satisfies the general equation,

$$y = ax^b \quad \ldots\ldots\ldots (2)$$

Assuming that Equation 2 will best fit the data, the method of least squares may then be applied in order to evaluate the constants (a) and (b). The equation calculated by this method is,

$$y = 8645.6x^{-1.5214} \quad \ldots\ldots\ldots (3)$$

Since the demand per apartment is nearly always the one required, (3) should be transposed in terms of (x), thus,

$$x = 386.85Y^{-0.657} \quad \ldots\ldots\ldots (4)$$

The smooth curve drawn through the

(Continued on Page 62)

O.K.'d BY THE INDUSTRY

Above—The new ROPER with smart, modern Kitchen Stool

What a reception!!! Immediately following the announcement of 1936 Roper Gas Ranges, a deluge of orders swamped the Rockford plant. Experienced gas men realized that here was a line of gas ranges that "had what it takes"—breath-taking modern beauty . . . sensational new convenience features . . . styles and models to suit every taste, every purse . . . simplification of detail for ease of adjustment and servicing—plus the well-known, dependable Roper efficiency of operation. And they backed their judgment with ORDERS!

O.K.'d by

SALES MANAGERS

. . . who are out to shatter sales records and will—with Roper!

O.K.'d by

SALESMEN

. . . knowing that new features — new talking points mean INCREASED COMMISSIONS!

O.K.'d by

SERVICE MEN

. . . who will save hours and hours of servicing time this year with Ropers!

O.K.'d by

HOME-MAKERS

. . . the final judges, who have found the 1936 Roper to be the gas range they want to buy!

ROPER *The Modern Gas Range*

Besides the five essential features of *any* MODERN gas range —efficient burners, heat control, insulated oven, roll-out broiler, and automatic top lighting—Roper offers you PLUS features that make selling easier. Full details are given in the new Roper combined catalog and Visual Sales Presentation. Write or wire for your copy today.

It's a Roper for 1936!

GEO. D. ROPER CORP. ROCKFORD, ILL.

SUMMER WATER HEATING

Eddystone Homes Apartments is Example of How Gas Fuel Renders This Service in Chicago Area

IN Chicago gas is used for summer water heating in many large apartment dwellings and hotels. Included among those buildings where the management has been far sighted enough to recognize the advantages of city gas for summer water heating, is the Eddystone Homes Apartments, located at 421 Melrose Street. This beautiful 23-story building, adjacent to the intersection of Sheridan Road and Lake Shore Drive, overlooks Belmont Yacht Harbor and Lake Michigan.

When originally erected, it was intended to be the first unit of one of the largest high class apartment housing projects in the country. Although this project has not materialized, the Eddystone is representative of the best in modern apartment buildings for those of most discriminating and fastidious tastes.

The exterior of the building which is constructed of face brick and limestone is shown in the accompanying illustration. The apartments, 79 in number, are arranged in four tiers and vary in size from two to 10 rooms each. In all, there is a total of 405 rooms, 168 bath rooms, 16 laundries and a privately operated valet shop for tenants' service only. The two, three and four-room apartments have single baths, the fives have two, the sixes three and the seven-, eight-, and ten-room apartments have four baths each.

With the introduction of a competitive seven months off-peak rate for water heating and steam generation, it is quite natural that gas was selected by the management as a fuel that would be in keeping with other modern improvements designed for tenants' comfort and convenience and increased operating efficiency.

The hot water requirements for Eddystone Homes are handled by a system which is in operation for 12 months of the year and which is entirely separate from the main heating plant. It consists of a 70-horse power Brownell H.R.T. downdraft boiler equipped with two external Bell and Gossett "water to water" heat exchangers which supply hot water to a 2500 gallon storage tank.

No pressure is carried on this plant and prior to the use of gas fuel, the boiler water temperature was held as close to 180° F. as hand firing would permit. The boiler water is circulated through the heat exchangers by means of a small electric pump in the return line. The hot water to the exchangers is taken off at the front, just below the boiler water line, and returned at the rear and bottom of the boiler.

THE EDDYSTONE HOMES APARTMENTS

By STEWART C. PARKER

Industrial Sales Engineer
The Peoples Gas Light and Coke Company

The supply for the building fixtures has a natural circulation from the Bell and Gossett exchangers to the storage tank at an average pressure of 100 lbs.

Because a separate down draft plant was used for water heating, no incinerator was required at the Eddystone. Garbage was burned upon the water grates while coal was fired on the lower ones. This condition necessitated hand firing of the boiler and frequent attention by engineers and janitors was required to control smoke.

The cost of supplying the hot water requirements between April 1 and October 31, based upon the use of an Eastern Kentucky coal at the current market price has been computed as follows:

73.5 tons at $6.35 =	$466.73
Ash removal (4 months).....	64.00
Grate maintenance & repairs....	35.00
Total	$565.73

Conversion of the above mentioned hot water system to utilize gas fuel was accomplished without making a single alteration to the boiler proper and through the utilization of a low priced conversion burner unit.

Development of this burner was one of the results of an extensive survey of summer water heating conditions in large apartment buildings made by sales engineers of The Peoples Gas Light and Coke Co.

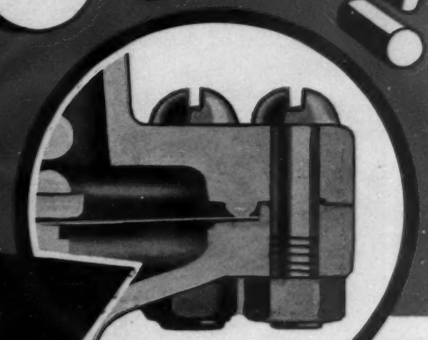
In the course of this survey, which included over 1,000 buildings having 24 or more apartments, it was found that the disposal of garbage in the boiler plant was common practice in the majority of cases. This condition precluded the possibility of installing burner equipment of the existing type and could not very well be eliminated.

Owners, receivers, trustees, managing agents and operators associated with the handling of large apartment buildings while recognizing the low cost of gas for summer water heating, were hesitant about making an investment in elaborate equipment that would not return its first cost in tangible savings within a very short period of time. If a separate gas-designed boiler were used, garbage would still have to be destroyed in the main boiler plant and consequently some coal would have to be burned for a sustaining heat.

To solve the engineering and sales problems involved in securing a large volume of this business, it was found necessary to develop a low priced conversion unit that could be adapted to nearly any kind of water heating plant using solid fuel. The design had to be such that it could be connected to the outside of the existing plant without making any changes in the boiler proper, such as the removal of grates or bricking up of the combustion chamber. Also it had to provide for destroying garbage in the fire box and to include a plan for attaching and removing the gas burner without interruption of the tenants' hot water service.

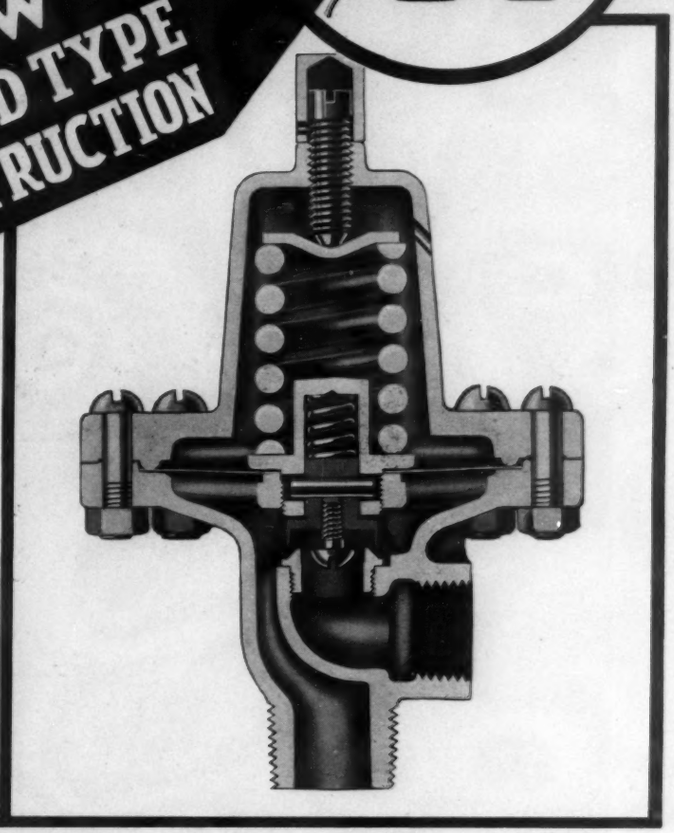
With the above specifications in mind, the Webster Engineering Co. developed a burner that has fulfilled every expectation in the way of performance and cost. This is especially true at the Eddy-

for ADDED STRENGTH!



NEW BOLTED TYPE CONSTRUCTION

Exterior view H-9045



Sectional view H-9045

The primary object in designing and manufacturing MUELLER RELIEF VALVES has always been to make them as dependable and trouble-proof as possible—not to build to a price, but to build to definite standards.

In line with this policy, MUELLER RELIEF VALVES are now being furnished with the new Bolted Type Construction. This new principal of locking the valve body to the spring chamber insures an even tension being exerted on the entire outer edge of the main diaphragm and positively eliminates any chance of leaking. It is impossible to twist or strain the diaphragm in assembling or re-assembling because the chamber is lifted off instead of being unscrewed from the body.

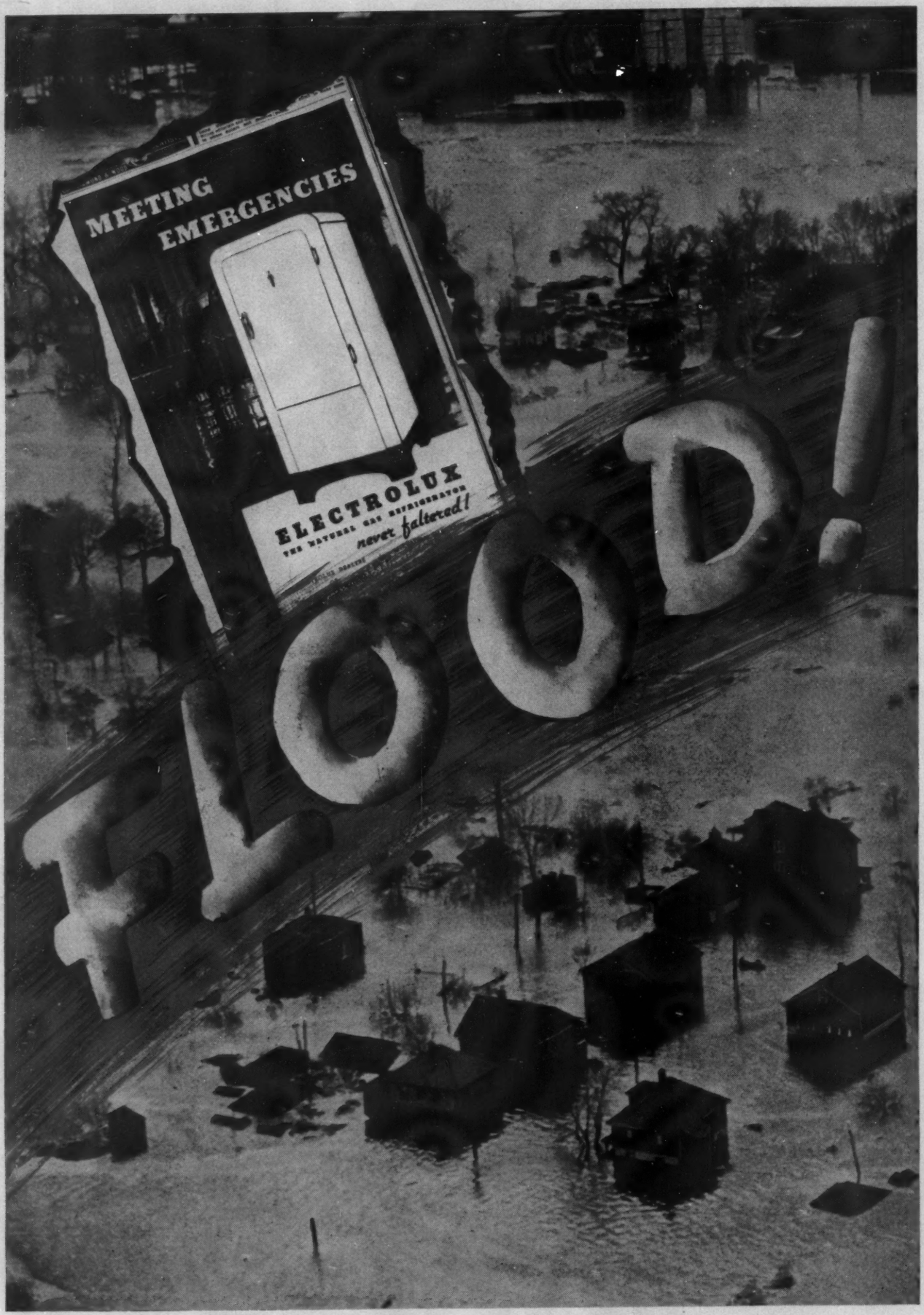
Of course there has been no change in the exclusive Auxiliary Spring Principle. This revolutionary development gives all MUELLER RELIEF VALVES an accuracy of response and a degree of safety that no other valve can give. Be sure to specify MUELLER.

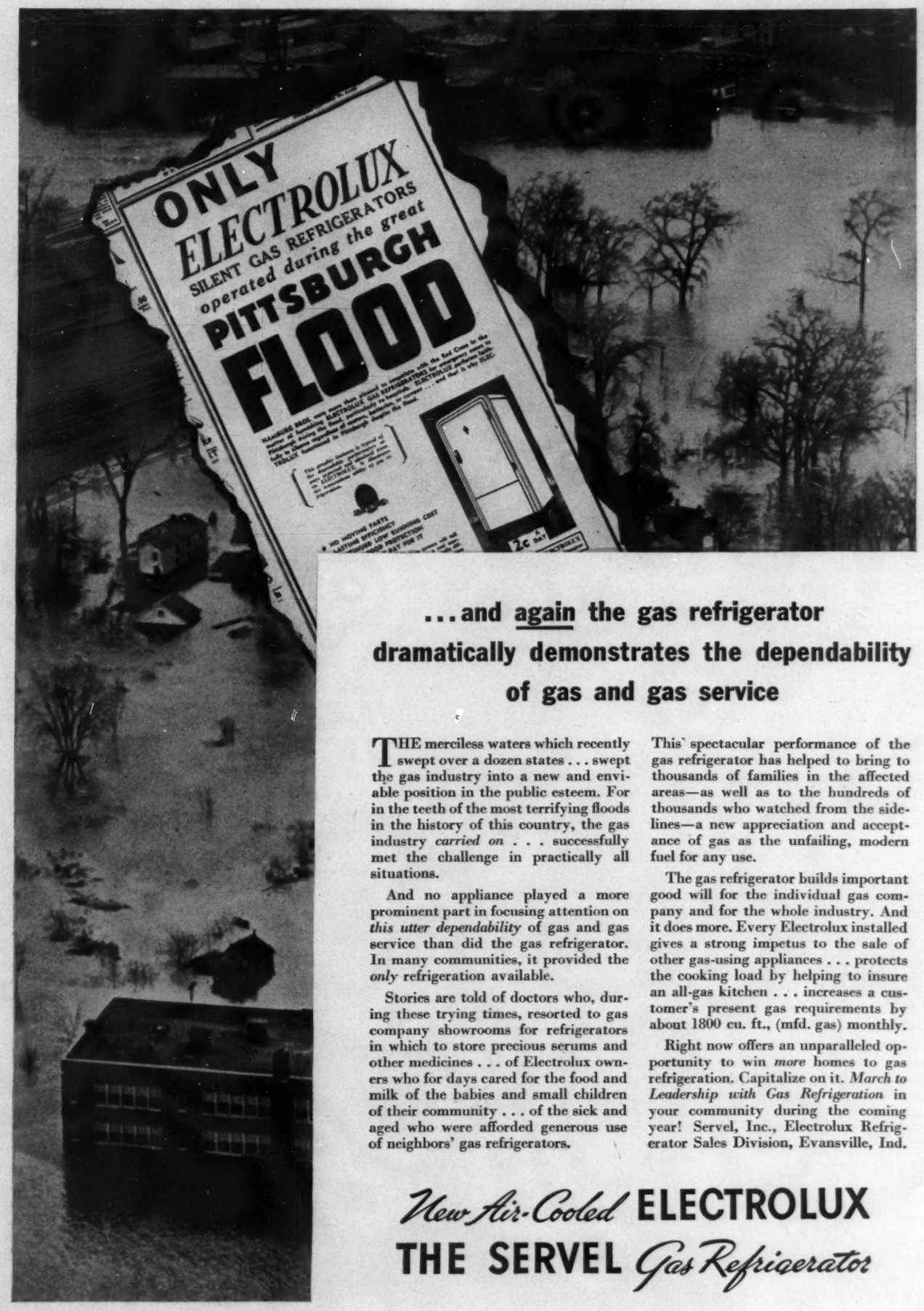
MUELLER CO., DECATUR, ILLINOIS

Muellers will show an outstanding achievement of interest to the entire gas industry at the Baker Hotel during the Natural Gas Convention May 5, 6, 7, and 8th.

MUELLER

GAS DISTRIBUTION EQUIPMENT


MEETING
EMERGENCIES
ELECTROLUX
THE NATURAL GAS REFRIGERATOR
never faltered!
FLOOD!



...and <u>again</u> the gas refrigerator dramatically demonstrates the dependability of gas and gas service

THE merciless waters which recently swept over a dozen states . . . swept the gas industry into a new and enviable position in the public esteem. For in the teeth of the most terrifying floods in the history of this country, the gas industry *carried on* . . . successfully met the challenge in practically all situations.

And no appliance played a more prominent part in focusing attention on *this utter dependability* of gas and gas service than did the gas refrigerator. In many communities, it provided the *only* refrigeration available.

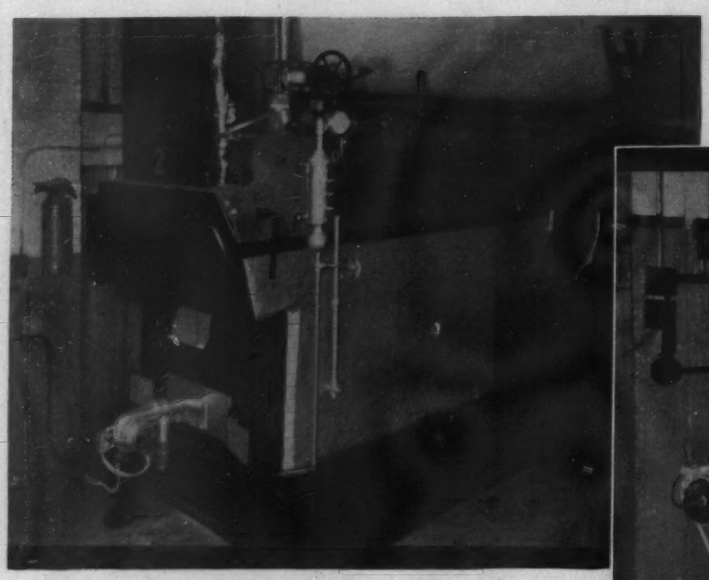
Stories are told of doctors who, during these trying times, resorted to gas company showrooms for refrigerators in which to store precious serums and other medicines . . . of Electrolux owners who for days cared for the food and milk of the babies and small children of their community . . . of the sick and aged who were afforded generous use of neighbors' gas refrigerators.

This spectacular performance of the gas refrigerator has helped to bring to thousands of families in the affected areas—as well as to the hundreds of thousands who watched from the sidelines—a new appreciation and acceptance of gas as the unfailing, modern fuel for any use.

The gas refrigerator builds important good will for the individual gas company and for the whole industry. And it does more. Every Electrolux installed gives a strong impetus to the sale of other gas-using appliances . . . protects the cooking load by helping to insure an all-gas kitchen . . . increases a customer's present gas requirements by about 1800 cu. ft., (mfd. gas) monthly.

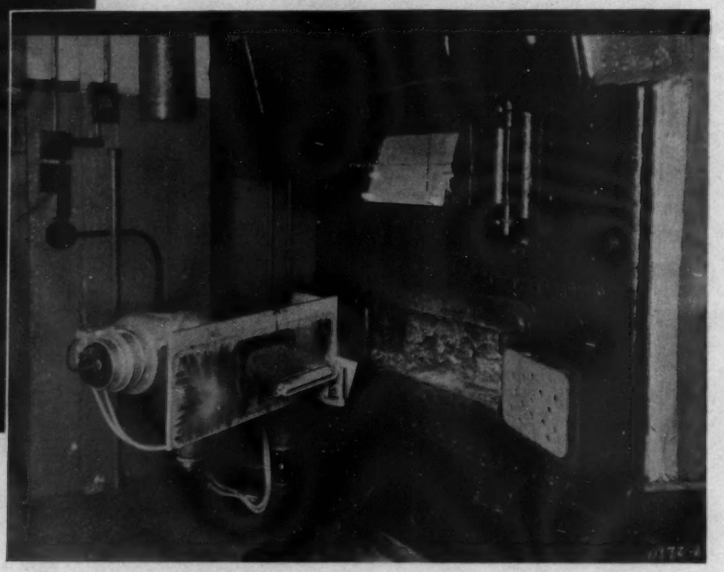
Right now offers an unparalleled opportunity to win *more* homes to gas refrigeration. Capitalize on it. *March to Leadership with Gas Refrigeration* in your community during the coming year! Servel, Inc., Electrolux Refrigerator Sales Division, Evansville, Ind.

New Air-Cooled **ELECTROLUX**
THE SERVEL *Gas Refrigerator*



ABOVE: Boiler which handles water heating load at Eddystone Homes Apartments, showing special gas conversion burner unit in position for firing. No alterations to boiler proper were necessary.

BELOW: Webster Engineering Co.'s No. 1600 J. G. burner ready to be swung into place. Stand on which it is mounted has two swing-type ell connections to facilitate placement of burner.



stone where it can be used for the full seven months' off peak period.

The new burner, which has been classified as a No. 1600 J. G. type, is shown in an accompanying illustration. It is mounted on a stand in front of the boiler that embodies two swing type ell connections which give the burner a double radial movement in order that it may be swung into a proper position on almost any type of boiler.

The burner proper is self-contained, including motor and housing, air adjustment ring, adjustable secondary air shutter, mixing tee, handle control switch and a flame retaining fish tail burner nozzle. A piece of ½-inch thick Transite board, cut to size and bolted to the nozzle casting, serves to replace the boiler doors when they are removed or swung back and also as a mounting support for the special safety pilot. This safety pilot and other auxiliary automatic controls and hand operated switches are hooked in series with the fan motor and gas valve so that in case of pilot or power failure, the entire circuit is open and all equipment is returned to the off position.

Flexible metallic gas hose is used on the pilot and suitable conduit on the electric wiring.

The 1600 J. G. burner comes equipped with a set of spools, which, when inserted in the mixing tee, regulate the gas-burning capacity. These spools provide for a range from 700 to 2700 cubic feet per hour of 800 B.t.u. gas. The Eddystone installation is set for 1450 cubic feet an hour. The burner employs the "all off—all on" principle.

The method of operation is simple. When changing from coal to gas, a layer of ashes is left on the grates and the burner is swung into place and turned on. The burner nozzle is inclined slightly downward and the flame has long wide sweeping characteristics. When garbage is burned in the firebox, incineration is more complete because of the direct impingement of the flame. When returning to coal operation, the burner can be used for kindling and then swung out of the way. If so desired, it can easily be removed at the end of the off peak season and stored until the following spring.

The usual control equipment consists of a pressurestat and a surface aquastat. The latter is attached at a suitable location either on the tank or hot water outlet from the boiler.

At the Eddystone, the surface aquastat is mounted to the boiler hot water outlet because of the very satisfactory results previously obtained by controlling temperature at this point rather than at the tank. The water temperature is held within 5° of 190° F., as indicated by a thermometer located at the center line of the boiler.

Both controls actuate the diaphragm valve in the gas line and the burner motor. Provisions are made to enable the attendant to "short out" the aquastat to permit of operation on pressure control in case of emergency steam requirements.

It might be well to mention at this point that the use of steam pressure during off peak months on vapor systems employing heat exchangers can often effect a saving in power by eliminating the use of vacuum pumps.

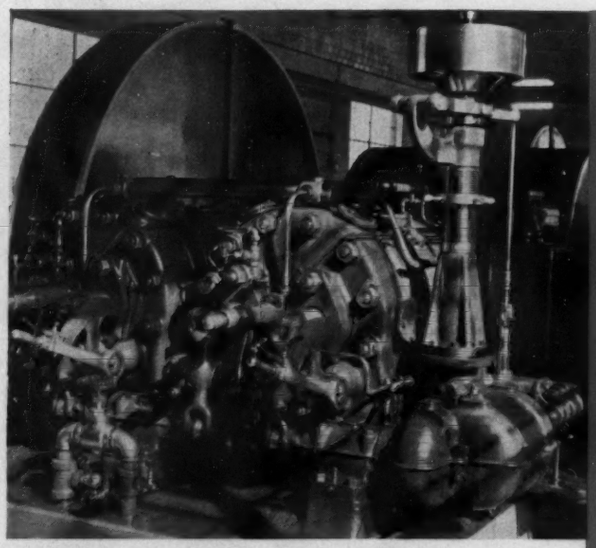
Some idea of the low installation cost of a 1600 J. G. burner can be had when it is considered that the installation pictured here, with the exception of the gas supply line from the meter to the boiler room, can be made in a single day by one fitter, a helper and an electrician.

The boiler room at Eddystone Homes is immaculate in appearance. Though the cost of operation with gas is practically the same as with coal, the management is very well satisfied with the results so far obtained and has recognized many intangibles that should readily compensate for the small investment necessary for gas equipment.

As a general rule, large apartment buildings in Chicago use a better grade of coal for summer water heating than that used at the Eddystone. Pocahontas coal costs from $1.00 to $1.25 per ton more and in such instances the investment necessary to utilize gas would be amortized by direct savings within a reasonable period of time.

Among the many intangible advantages recognized by the management of Eddystone and other large buildings now using gas for summer water heating are the elimination of smoke; better service to tenants; more labor available for building maintenance; less dust and dirt; cleaner basements, laundries, and bag-

(Continued on Page 93)



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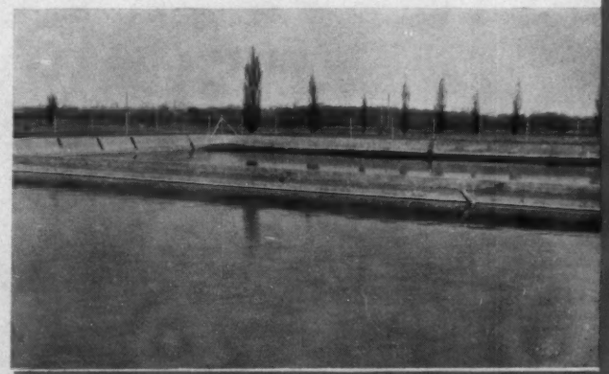

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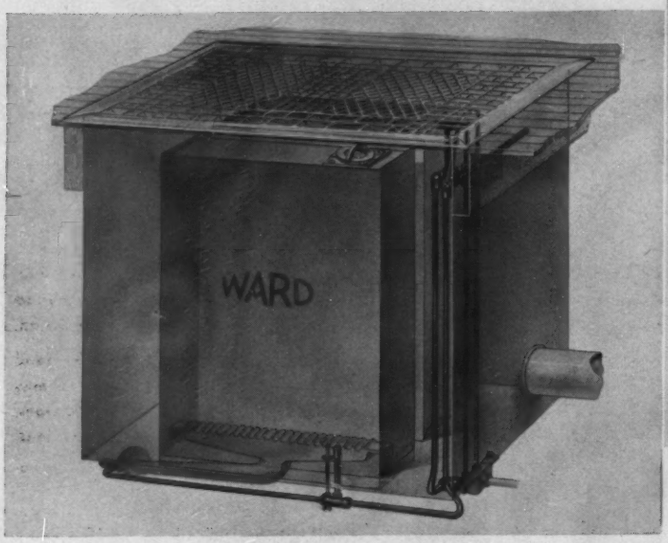

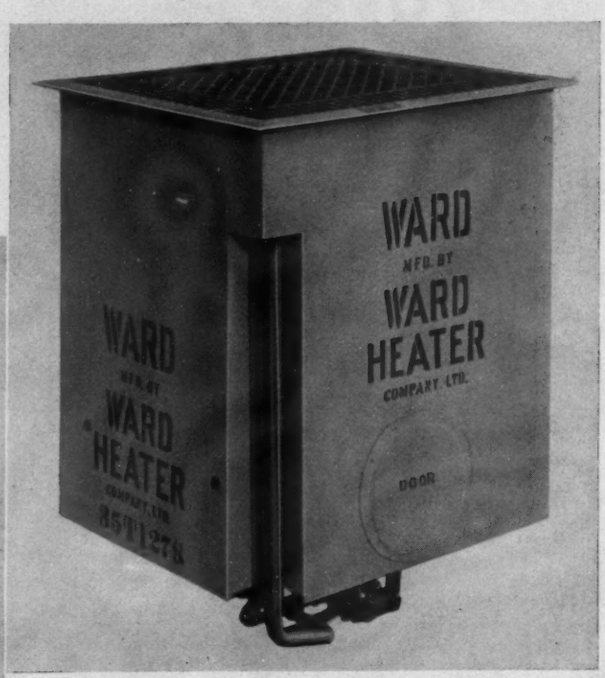

Ward Floor Furnace fabricated of Toncan Copper Molybdenum Iron by Ward Heater Company, Ltd., Los Angeles, California.

● "Built of 16 and 18 gauge Toncan Iron"—eight words in a Ward Floor Furnace advertisement, but how important!

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● **M. T. BURTON, Southern California Gas Co., Los Angeles, Calif.: addressing Technical Section Spring Conference, Pacific Coast Gas Association, Los Angeles, March 26-27, 1936—(Abstract by GAS).**

PHOTO-COLORIMETER

for Determination of Hydrogen Sulphide in Natural Gas

HYDROGEN sulphide, being very chemically active, may be detected or quantitatively determined by a number of methods, depending to a large extent upon the concentration present. In the case of natural gas the concentration of hydrogen sulphide, except for gas from certain "sour gas" fields, is rarely more than a few grains per 100 cubic feet, and often only a fraction of a grain.

The practical methods so far developed for determination of such small concentrations have not satisfied all the requirements of sensitivity, accuracy, simplicity and rapidity. In the search for a more effective method, it was indicated that a procedure based on the formation of a blue dye, methylene blue (commonly known as the "Lauth Reaction") through the interaction of the sulphide and para aminodimethylaniline sulphate, had possibilities. The method is as follows:*

The hydrogen sulphide is absorbed in a gas absorption bottle containing 130 cc. of 1 per cent zinc acetate and 5 cc. of 10 per cent sodium hydroxide. Disconnect the absorbing bottle and treat the contents with 25 cc. of diamine reagent. Mix this reagent and solution of the remaining zinc hydroxide by a rapid whirling of the bottle, after which add 5 cc. of 0.02 mol ferric chloride and mix.

The blue color develops at once and is proportional (after a 2-hour reaction) to the amount of hydrogen sulphide present. Transfer the blue solution to a 250-cc. volumetric flask. When the hydrogen sulphide amounts to 0.0001 gram or more, a blue color, which can be matched very readily with standards after 2 hours, is obtained.

The standards may be prepared by dissolving O. P. sodium sulphide in distilled water. After standing several hours, it is analyzed by iodometric methods. When the concentration has thus been found, dilute a portion with boiled and cooled distilled water so that each cubic centimeter contains 0.0001 gram of sulphur. In preparing the standard colors, place 130 cc. of zinc acetate solution and 5 cc. of 10 per cent sodium hydroxide in a 250-cc. volumetric flask. Pipet in the requisite amount of standard sodium sulphide solution, followed immediately by 25 cc. of diamine reagent and 5 cc. of ferric chloride solution. After the colors are developed, dilute the solutions to the mark. The colors may be compared in a colorimeter or in Nessler tubes, but the standard used should not be over 100 per cent stronger than the unknown under analysis.

The following solutions and reagents are necessary:

(1) 0.02 mol ferric chloride hexahydrate in 4 per cent hydrochloric acid;

(2) diamine reagent, prepared by dissolving 0.1 gram of p-aminodimethylaniline sulphate (Eastman Kodak Co., No. 1333) in 100 cc. of hydrochloric acid (1:1);

(3) 10 per cent sodium hydroxide.

In place of sodium sulphide, which requires troublesome protection against oxidation, a solution of allylthiourea can be employed with advantage. This is checked by gravimetric determination of silver sulphide on treatment with ammoniacal silver chloride solution.

The chief disadvantages of this method are that the color standards retain their accuracy for only a few weeks, necessitating frequent preparation, which is slow, laborious, and expensive, and that the human eye is unable to accurately match colors.

To eliminate these difficulties, the idea was conceived by Mr. Burton of using a photo-electric colorimeter calibrated in terms of sulphide standards.

The colorimeter consists essentially of a photo-cell and vacuum tube amplifier, an output meter, a liquid exposure cell and a light source and light filter. Fig. 1 shows the schematic lay-out.

The photo-cell is a high vacuum type sodium cell (Burt), having its maximum color response in the blue, and gives a strictly linear output.

The amplifier circuit, Fig. 2, is of necessity of the direct current type to

(Continued on Page 60)

*Abstracted from paper by Shepard and Hudson, Ind. & Eng. Chem. Anal. 2, 73 (1930).

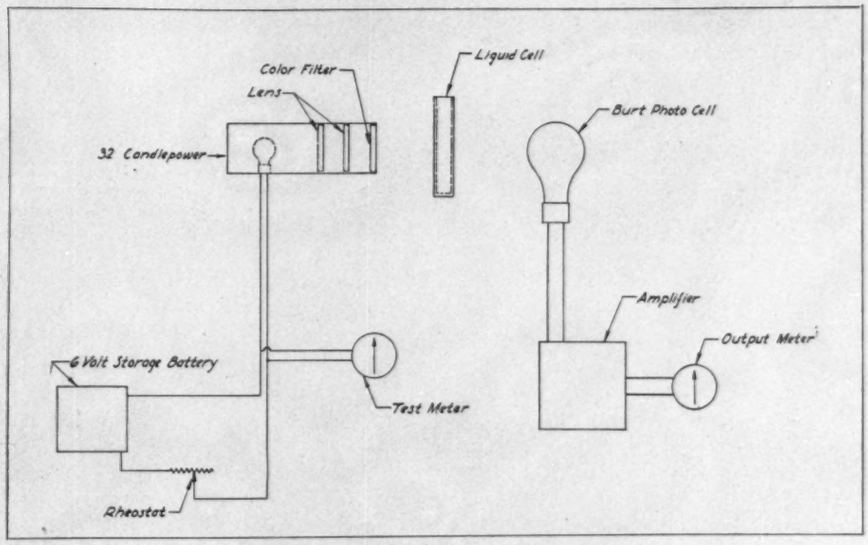

FIG. 1. Schematic layout of photo-colorimeter.

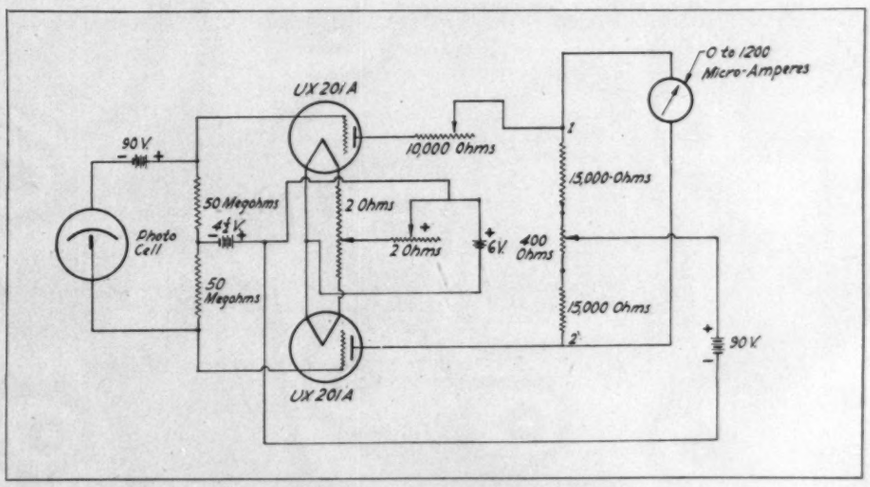

FIG. 2. Sketch showing colorimeter circuit.

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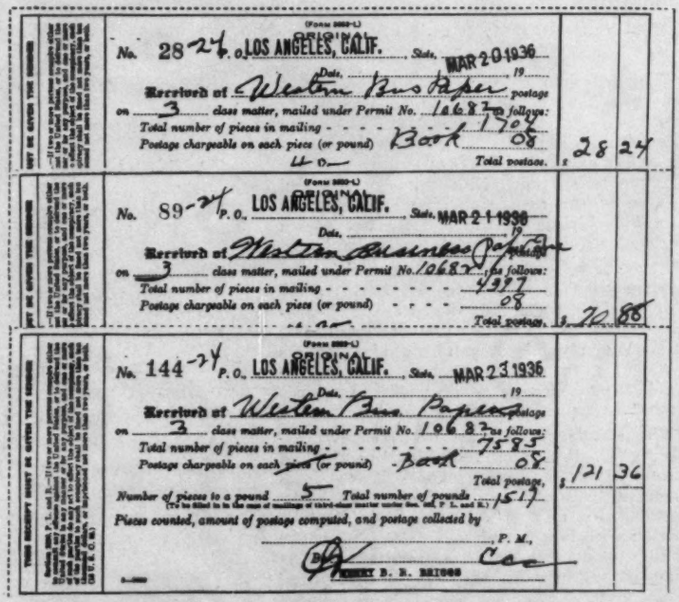

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By A. L. FORBES, JR.

General Superintendent
El Paso Natural Gas Company

El Paso Natural Gas Company's PURIFICATION PLANT AT JAL

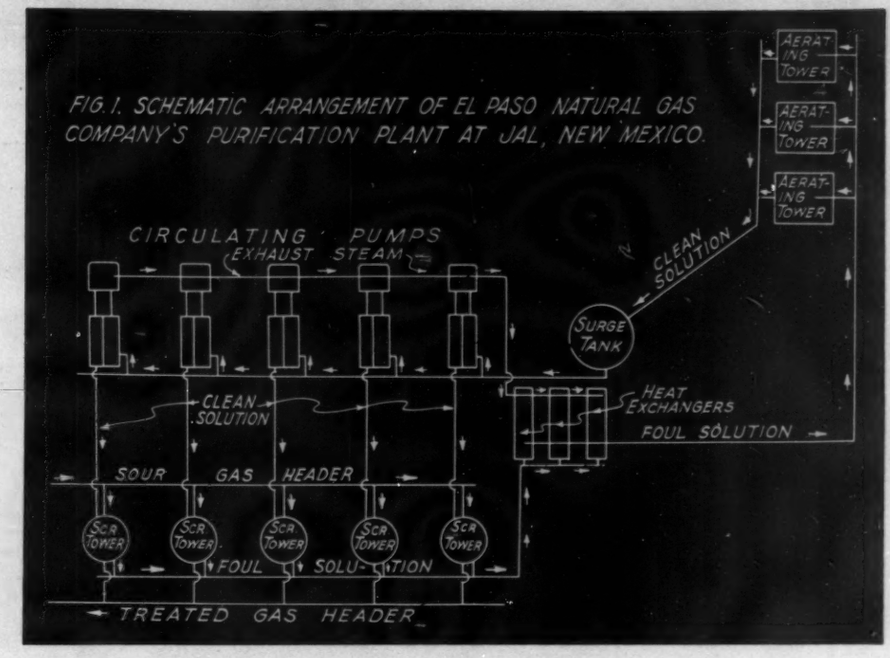


FIG. 1. SCHEMATIC ARRANGEMENT OF EL PASO NATURAL GAS COMPANY'S PURIFICATION PLANT AT JAL, NEW MEXICO.

DURING the Fall of 1935 the El Paso Natural Gas Co. completed the installation of a new 60,000 Mc.f. per day hydrogen sulphide treating plant at Jal, New Mexico.

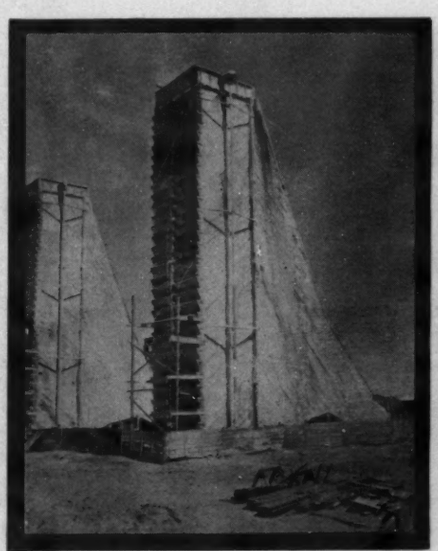
The arrangement and design of all equipment is of its own and was based on this company's seven years experience with treating large quantities of natural gas containing from 75 to 500 grains of hydrogen sulphide per hundred cubic feet at pressures of from 400 to 500 pounds per square inch.

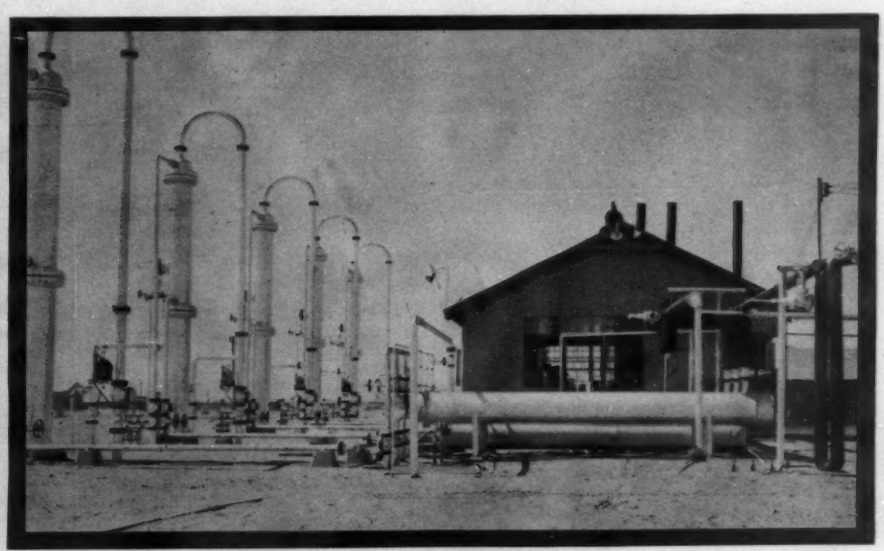
Fig. 1 shows a schematic arrangement of the plant, in which a modified Seaboard process is used.

The scrubbing towers were patented by two employees of this company and are especially adapted to treating gas at high pressures. Each tower is 20 inches in diameter and 24 feet high and consists of two scrubbing chambers, one on top of the other and so divided that the gas passes from the top chamber to the bottom while foul soda ash solution is drawn off from each chamber independently by automatic liquid level control valves. The scrubbing towers are so constructed that they may be dismantled and the tube sections which form the means of scrubbing the gas with soda ash solution may be renewed or cleaned out. Each tower is an independent unit and has a treating capacity of 12,000 Mc.f. per day. Each scrubber has its own steam-driven pump and is entirely independent of the other towers, which permits great flexibility in operation as repair work on one unit does not interfere with the operation of the other towers.

Each tower is equipped with a flow meter on the sour gas inlet line so that the quantity of gas treated by each tower may be regulated. The exhaust steam from the pumps is condensed in heat exchangers of conventional tube type, by means of the foul soda ash solution on its way to the aerating towers. Steam is provided by three 150 h.p. H.R.T. boilers.

The larger photograph shows the scrubbing towers, pump house and heat exchangers. *(Continued on Page 93)*





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MILPITAS LINE IS MAJOR ADDITION TO P. G. and E.'s SYSTEM

By FRED F. DOYLE

Manager Natural Gas Division
Pacific Gas and Electric Company

THE facilities of the natural gas transmission system of the Pacific Gas and Electric Co. were augmented by the completion in February last of a second pipeline from Milpitas Terminal to San Francisco.

FRED F. DOYLE

In 1929, when the original system was constructed, it extended from the Buttonwillow gas field, which lies 28 miles northwest of Bakersfield in Kern County, 50 miles to the famous Kettleman Hills field in Fresno and Kings Counties — thence 150 miles via Hollister and San Jose to Milpitas Terminal, 6 miles north of the latter city.

At that terminal the line divided, one branch being constructed north along the east side of San Francisco Bay to Oakland and one along the west side of the bay to San Francisco. In 1930, a second line, known as the Standard-Pacific Gas Line, was built north through the San Joaquin Valley via Tracy and through Pittsburgh, Martinez, and Crockett to San Pablo, where it connected to a second line extending south to Berkeley and Oakland, thus giving that territory connections to two lines from opposite directions.

The one line to San Francisco, 20 inches in diameter, was built very close to the Bay and followed for most of the distance a thoroughfare known as the Bayshore Highway. It was constructed in low lands subjected to tides; therefore, in case of trouble, coffer dams have to be built around excavations, water pumped out and, if deep enough, repair work has to be done at low tide.

Electrolytic action was also experienced on the line, making it necessary to correct that trouble by means of cathodic protection. Regardless of the general conditions, however, no great amount of trouble has been experienced on the line, but a break taking some time to repair would have caused serious trouble.

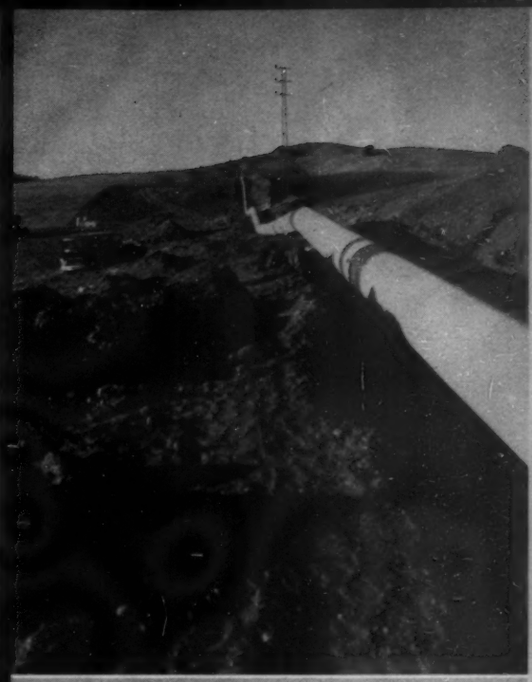
It was decided to construct a second line from Milpitas to San Francisco, adding to the capacity of the system and giving a greater factor of safety for the supply.

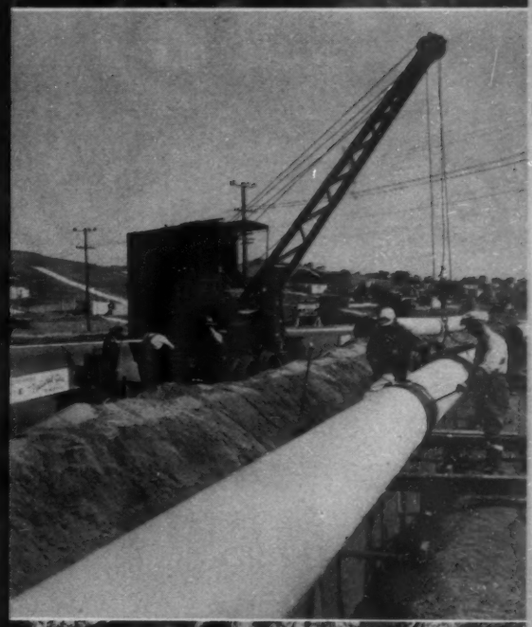
The new line is 22 inches in diameter, double bell pipe, with a thickness of 5/16 of an inch, both longitudinal factory joints and girth or field welds being made electrically. It runs parallel to the original line for a short distance west of the Milpitas Terminal, but takes a general course further west of the first line away from the bay shore and at elevations several hundred feet above sea level.

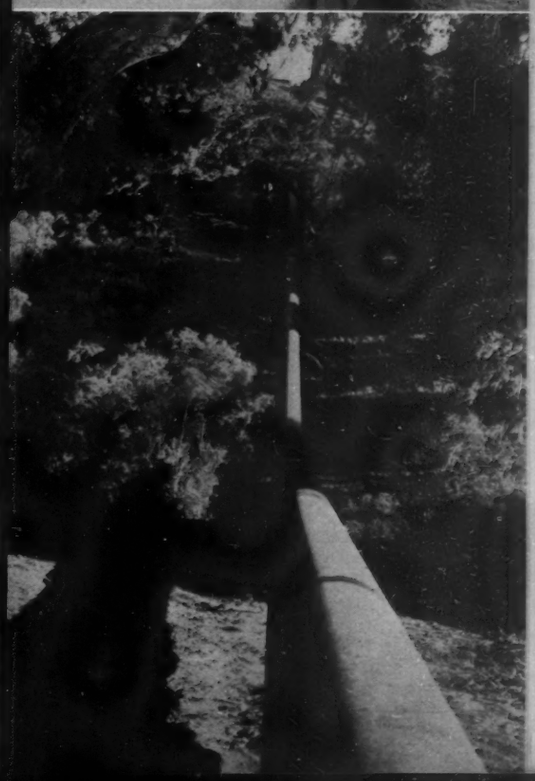
The pipe was received in 30- and 60-foot lengths and laid in a trench approximately 30 inches wide and 40 inches deep. Before the line was constructed a soil survey was made along the entire right of way, to determine the possibilities of corrosion or electrolysis. As a result of the survey, it was decided to double wrap almost the entire line and single wrap the balance.

The pipe was wrapped by machine at the mill as it was manufactured, and hauled directly to the job by trucks. All joints, of course, were hand-wrapped in the trench.

Main line valves, size 22-inch, of the greased plug type, were placed in the line at accessible points for emergency use; Van Stone flanges were used to connect them and on the down stream side of each there was installed a rubber-gasketted coupling. A 6-inch blow-off valve was placed on each side of each main line valve in a vertical position on top of the pipe. *(Continued on Page 94)*





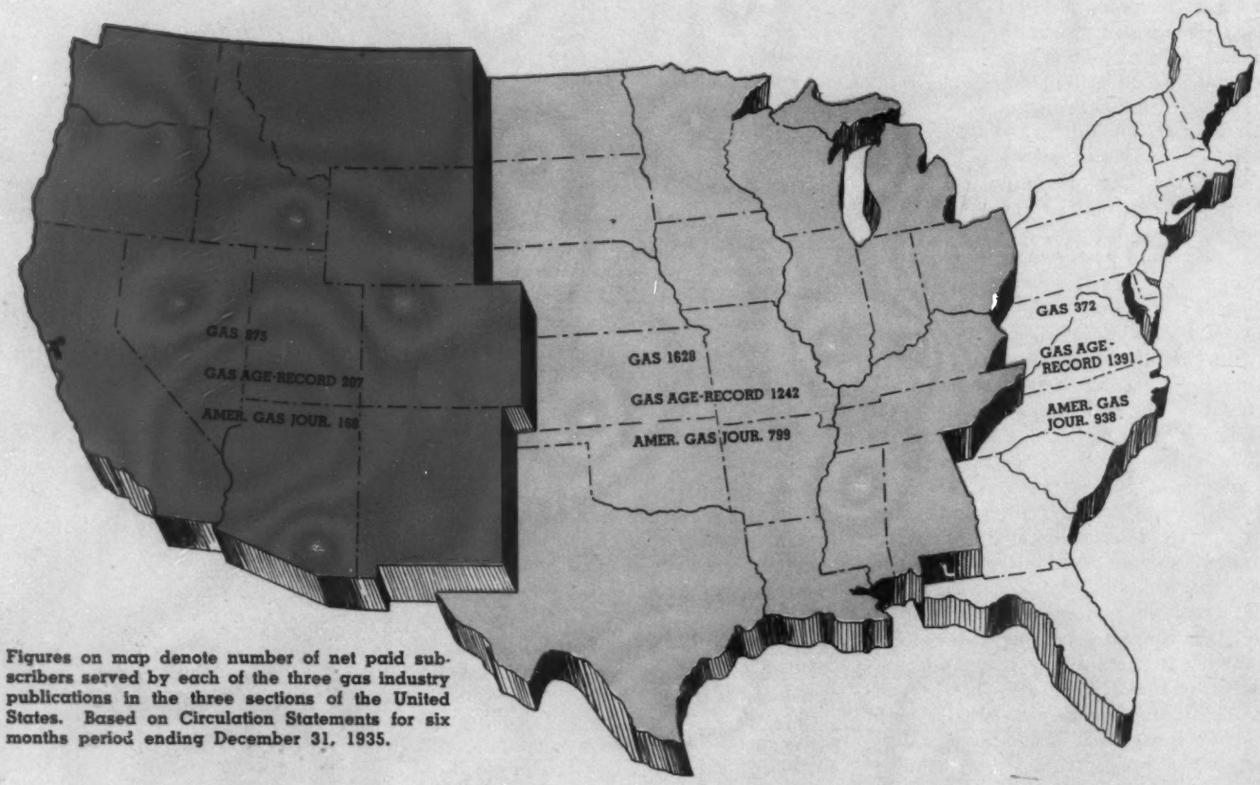


ILLUSTRATIONS

UPPER: Section of 22-inch Milpitas-to-San Francisco line, through open, hilly country. CENTER: Lining up pipe along boulevard in San Francisco. LOWER: Crossing one of many small stream beds, in wooded country on the Peninsula.

EASTWARD HO!

The first issue of WESTERN GAS came out in 1925. Marked activity in the development and utilization of natural gas in the western area had just begun, and WESTERN GAS—founded to serve this area—was appropriately named. At about the same time, new natural gas developments began in the southwest, and pipe lines were radiating in all directions through the mountain, mid-west, central and eastern states. WESTERN GAS paralleled these activities in editorial and circulation coverage. By voluntary subscriptions, its circulaton moved eastward and soon became representative of the expansion of the natural gas industry on a national scale. Long ago the name WESTERN GAS was outgrown, for while the paper continued to serve its original territory almost to the exclusion of all other publications in the same classification, it also attained an actual dominance throughout the great mid-west section and became a powerful factor clear over to the east coast.



Figures on map denote number of net paid subscribers served by each of the three gas industry publications in the three sections of the United States. Based on Circulation Statements for six months period ending December 31, 1935.

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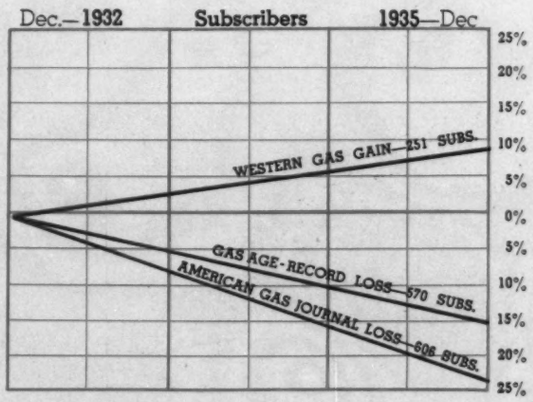

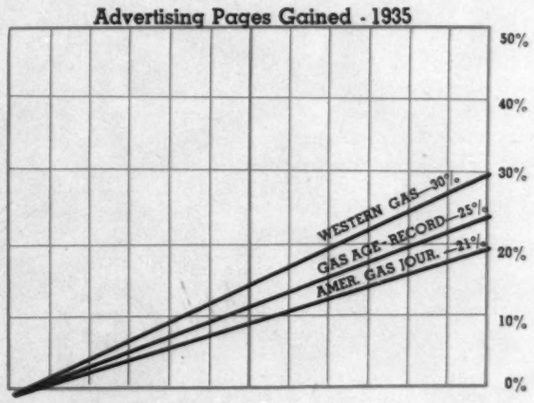

LOS ANGELES— *810 So. Spring St. • 1064 Peoples Gas Bldg.* —**CHICAGO**

GAS CAMERA

LITTLE THEATRE: "20 Million Years," a film prepared by the gas companies of Southern California, depicting the history of natural gas from its origin to its service in the modern home, is shown hourly in this Little Theatre, a part of the gas industry exhibit at the California Pacific International Exposition, San Diego.

COPY JUDGES: The "Better Copy Committee" of the Public Utility Advertising Association looks over advertising copy submitted in the annual contest among utilities in 36 states and Canada. Meeting at the Palmer House in Chicago on April 3 were (back row) Iowa Electric L. & P.'s H. J. Rowe, Commonwealth Edison's E. Frank Gardner, Byllesby Engineering and Management's T. P. Pfeiffer; (front row) Washington Gas Light's Wilmot Squier, Estate Stove's Walter Rowe, Union G. & E.'s Kenneth Magers (chairman).

BANQUET: Discussion of new and improved appliances featured the Sales Conference of the American Gas Products Corp., April 3, 4, and 5. Photo taken at Empire Hotel, New York City.

DEMONSTRATION: For the benefit of delegates attending the Mid-West Gas Association meeting in Minneapolis, April 13-15, John K. Swanson (left) and E. J. Boyer of Minneapolis Gas Light Co. supervised an experiment in powering a company demonstration car with natural gas stored in high-pressure containers.

HIGH WATER: On March 17 Susquehanna River flood waters struck the Binghamton Gas Works, Binghamton, N. Y., shut down coal boilers and all electrically driven apparatus. Switching to available reserves of natural gas, the company maintained uninterrupted service during the week of repairs, before mixed gas service could be resumed.

TORNADO: At 10:05 A.M., April 6, a tornado cloud twisting through Georgia struck Anderson, leveled the Anderson Gas Co.'s plant. Crews under command of Manager J. H. Rider brought order out of chaos, and at 3 P.M., April 8 (50 hours later), had restored gas service to the city.

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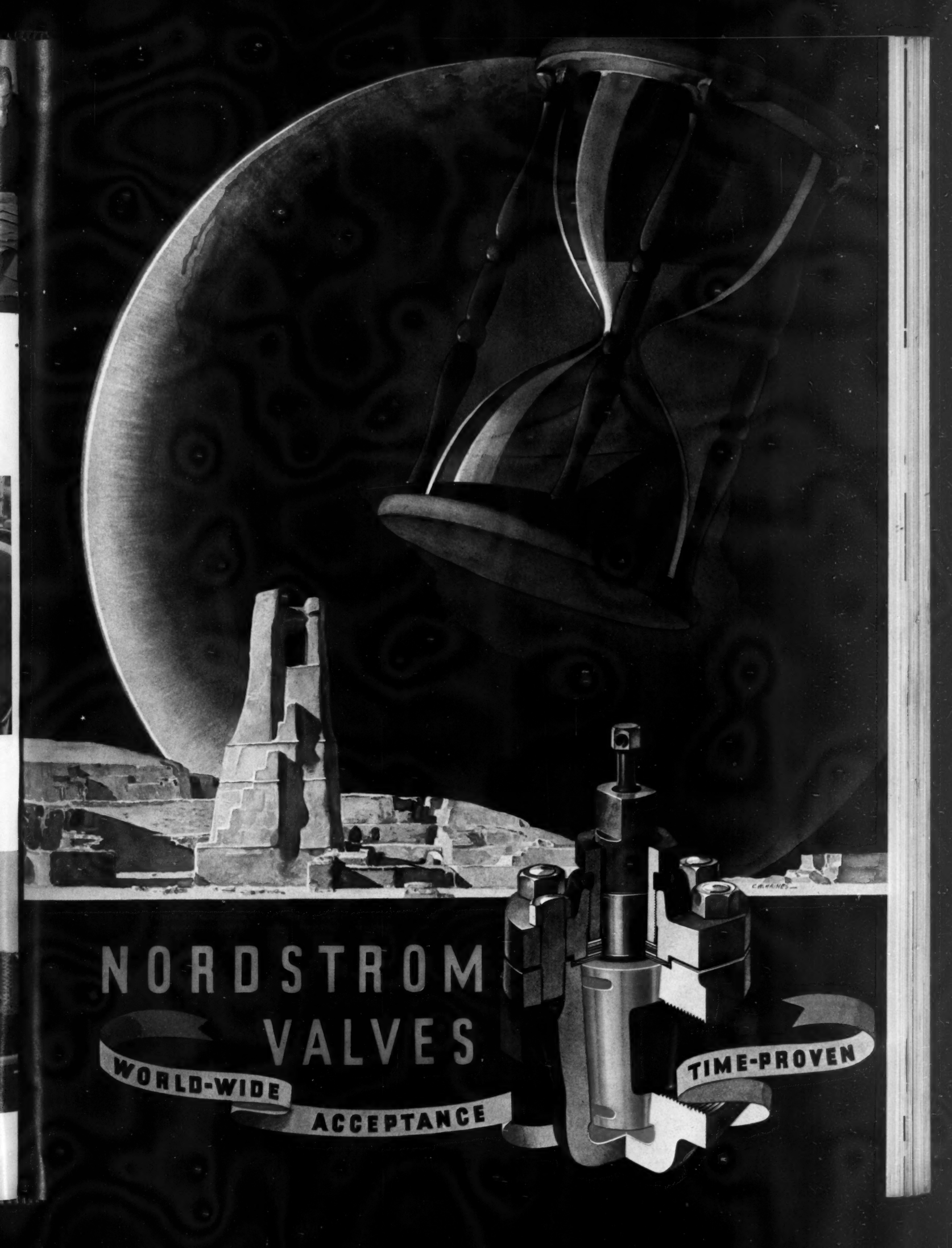
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ACCEPTANCE
TIME-PROVEN

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NOTHING IS CONSTANT BUT

CHANGE

Time changes everything! Mountains erode; continents appear and disappear; the oldest known evidences of architecture yield. Time takes its toll — inevitably. Translated in modern perspective, consider the Gas Industry . . . . . Plants and equipment of yesterday are antiquated today. Economy of the past is present extravagance. Progress follows in the wake of change. *Valves* are a specific example. New operating demands exact higher levels of performance. Compounded pressures, extreme temperatures, factors of corrosion and countless other drastic conditions must be conquered. Nordstrom Engineers have envisioned these and future needs. They design ahead of contemporary progress. Nordstrom Lubricated Valves are a product of this vision. They have met, and will continue to meet, every challenge. In planning your *valve* installations and replacements, consider Nordstroms for *every* application. . . . . They shall *not* fail!

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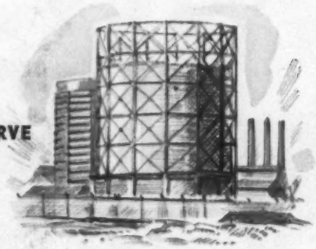

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ACTION ON THE PIPE LINE

Current Gas Transmission Line Construction Described; Reference Tables on Major Systems

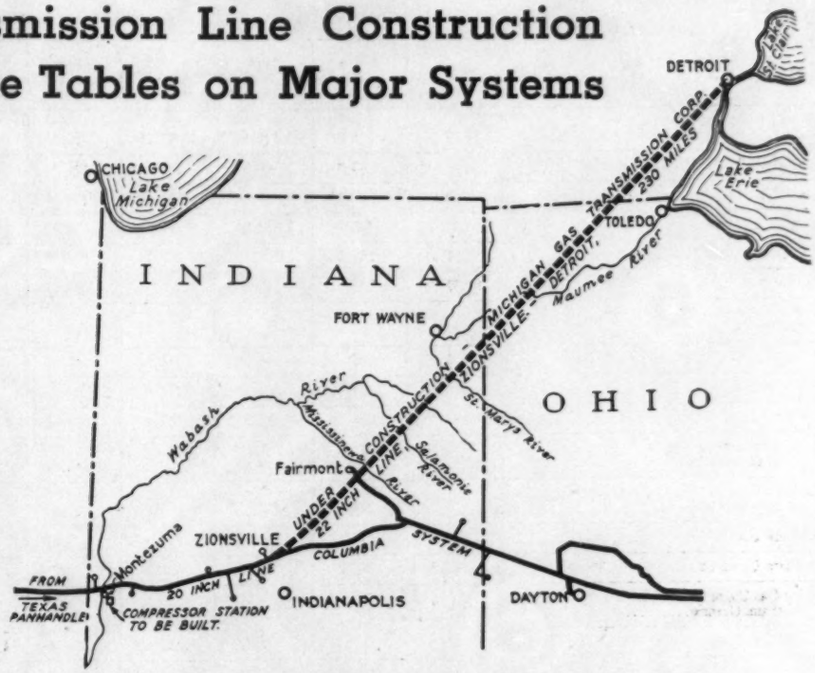
By ANATOL FOMILYANT
News Editor, GAS

ANOTHER of America's major industrial areas is preparing to welcome natural gas, as the Detroit line enters the construction stage. Michigan is the scene of more natural gas line activity, with Lansing preparing to turn on natural gas and the Grand Rapids line getting under way. Several score towns of Kansas and Nebraska are due to be linked to natural gas reserves through new construction, now in its early stages. Canada joins the procession with announcement of new line enterprises planned in Saskatchewan.

These and other projects are again pushing out the boundaries of natural gas service, lifting the construction branch of the industry out of the doldrums in which it has been becalmed through the latter half of the depression period.

In this feature *GAS* has gathered together highlights on the more recently constructed natural gas lines, as well as those now under way and several of the projects which are emerging as possible undertakings for the future.

Along with this running comment on current construction are published two tables prepared through the cooperation of the principal companies operating transmission systems. The first of these, appearing on the next page, is a summary of additions to transmission lines and compressor station capacities made during the past 5-year period by a group of companies active in construction. This table shows in the neighborhood of 3,500 miles of new line added since 1931 by the seventeen companies listed. Many small projects not covered in this summary would increase this total greatly.



Route to Detroit of Michigan Gas Transmission Corp.'s line, now under construction

In the second table, on pages 54 and 56, are recorded the total miles of line operated, and the total installed compressor capacity for a group of more than 60 companies. Here again the report is limited in main to the larger properties, and is not in any sense offered as a complete mileage total. Companies reported, however, are shown to have nearly 70,000 miles of transmission lines in operation as of 1936, which includes the bulk of the industry's main line facilities.

Detroit Line Begun

The 230-mile 22-inch Detroit line, which will bring natural gas from the Texas Panhandle into Michigan, is the largest gas line project of recent years. Columbia Gas & Electric Corp. is financing the undertaking and has formed the Michigan Gas Transmission Corp. to operate the line, construction beginning in April. *(Continued on Page 52)*

• Though the right-of-way to Lansing, Mich., was snowbound, Consumers Power Co. carried through its line construction on schedule.

FIVE-YEAR GAIN IN PIPE LINE AND COMPRESSOR STATION FACILITIES

COMPANY	TRANSMISSION MAIN OPERATED							COMPRESSOR STATION CAPACITY		
	Miles Operated 1931			Miles Operated 1936			Five-Year Gain in Mileage (All Sizes)	Total Installed B.H.P. 1931	Total Installed B.H.P. 1936	Five-Year Gain in Total Capacity
	Under 8-Inch	8-Inch and Larger	Total Miles (All Sizes)	Under 8-Inch	8-Inch and Larger	Total Miles (All Sizes)				
Colorado Interstate Gas Co., Colorado Springs, Colo.	39.37	344.81	384.18	71.25	356.65	427.90	43.72	8,000	8,000	
Consumers Power Co., Jackson, Mich.		40.0	40.0	113.6	124.5	238.1	198.1			
East Ohio Gas Co., Cleveland, Ohio	529.86	781.60	1,311.46	551.29	791.16	1,342.45	30.99	2,830	2,805	
Kansas Power and Light Co., Salina, Kan.	414.65	605.74	1,020.39	567.16	614.36	1,181.52	161.13	9,675	10,075	400
Kentucky Natural Gas Corp., Owensboro, Ky.	251.97	355.16	607.13	333.78	363.04	696.82	89.67		1,085	1,085
Lone Star Gas Co., Dallas, Texas	1,532	1,965	3,497	1,755	2,127	3,882	385	36,665	35,545	
New York State Natural Gas Corp., Pittsburgh, Pa.					160	160	160		960	960
North Central Gas Co., Casper, Wyo.	26.25	233.81*	260.06	111.94	145.52	257.46	221.40	1,320	1,320	
North Penn Gas Co., Port Allegany, Pa.	246.74	106.99	353.73	286.6	108.6	395.2	41.47	2,775	4,702	1,927
Northern Natural Gas Co., Omaha, Neb.	435.70	1,008.59	1,444.29	755.47	1,394.31	2,149.78	705.49	12,000	25,980	13,980
Pacific Gas and Electric Co., San Francisco, Calif.		479.52	479.52		548.37	548.37	68.85	5,320	5,320	
Southern Counties Gas Co. of California, Los Angeles, Calif.	4.9	110.4	115.3	5.8	227.2	233.0	117.7			
Southern Fuel Co., Los Angeles, Calif.					212.03	212.03	212.03			
Southern Union Gas Co., Dallas, Texas	481.9	307.3	789.2	523.0	307.3	830.3	41.1			
Union Gas Co. of Canada, Ltd., Chatham, Ontario	163.68	212.86	376.54	167.40	259.58	426.98	50.44	1,350	1,350	
United Gas Public Service Co., Houston, Texas	991.39	3,407.33	4,398.72	1,451.00	3,525.60	4,976.60	577.88	55,185	54,760	
Western Gas Co., El Paso, Texas	14.37	278.25	292.62	91.90	495.19	587.09	294.47	2,280	2,280	

*Two hundred and twenty-four miles of this total (leased line) have been replaced by new construction.

Panhandle Eastern Pipe Line Co. delivers Texas gas at a point on the Illinois-Indiana state line that is due west of Indianapolis, into a 20-inch line formerly owned by the Indiana Gas Transmission Corp., a Columbia subsidiary, but now merged with the newly formed Michigan Gas Transmission Corp. At a point near Zionsville about 11 miles north of Indianapolis, the line to Detroit will tap the 20-inch line, and from there will run in a nearly straight line northeastward, terminating at Melvindale on the outskirts of Detroit.

The line route crosses the Mississinewa, Salanomie, upper branch of the Wabash, and the St. Marys River in Indiana, and the Maumee River in Ohio (see map on page 51). Each river crossing will consist of four 12-inch lines having a wall thickness of ½ inch, while the 22-inch pipe will have a wall thickness of ⅜ inch. A tile drainage system which drains the farm land along the line route will have to be broken into by the construction crews in several places and the consequent excessive water and mud are expected to present some difficulty. The pipe will be delivered in 40-foot lengths with alternate joints to be welded in the field and the 80-foot sections coupled on that portion of the line through Indiana and Ohio. The Michigan portion will be all coupled. The Indiana and Ohio section will receive a protective coating while the pipe in Michigan will be laid bare.

United Engineers and Constructors Inc., Philadelphia, Pa., has been awarded the contract for laying the line through Michigan, while W. S. Bibbs will lay the line through Indiana and Ohio. H. C. Price, Inc., Bartlesville, Okla., will do the electrical welding on the line and Dresser couplings will be used, with National Tube Co. supplying the pipe.

Clearing the right of way began about April 6 and actual construction about a week later, the line to be completed by July 1. A compressor station will be built at Montezuma on the former Indiana Gas Transmission Corp. line about 11 miles east of the Illinois-Indiana state border. Several other compressor stations and additions to present capacities along the Panhandle Eastern line are tentatively planned.

Grand Rapids Addition

With permission finally granted by the Michigan Public Utilities Commission, Grand Rapids Gas Light Co. began construction on April 20 of its 10-inch, 45-mile line bringing gas from the Hinton - Millbrook - Belvidere field to Grand Rapids. It is scheduled to be completed about June 20, after which time Grand Rapids will be served mixed gas. Cost of the line is approximately $500,000.

Grand Rapids Gas Light Co. is an American Light & Traction subsidiary, and United Light & Power Engineering & Construction Co., Davenport, Iowa, an affiliated organization, will have charge of laying this line.

New Link for Northern Natural

The 26-inch line now under construction from the Hugoton gas fields in Kansas to Mullinville, Kansas, is a 106-mile addition to Northern Natural Gas Co.'s facilities. From the gas fields the route is practically a straight line running just a few degrees north of east to Mullinville. At Mullinville it feeds into the company's main 26-inch carrier running northeastward. This line is being constructed for the purpose of transporting the company's requirements for gas from the Hugoton fields, which now are being transported through the

N. G. E. GAS BURNERS

for every combustion problem

More than two million boiler horse power is now being developed with gas burners manufactured by Natural Gas Equipment, Inc. In both large and small plants N.G.E. Gas Burners and associated combustion equipment have proved to be the most economical and efficient solution of the fuel problem.

Complete N.G.E. line provides a wide selection of gas burners specifically designed to meet various requirements for practically all types of boilers, furnaces, ovens and kilns.

Operators are invited to utilize the full cooperation of N.G.E. engineers both in selecting the type of burner best adapted to their particular requirements and in securing the most economical installation and operation. Requests for complete N.G.E. catalog will receive prompt attention.

NATURAL GAS EQUIPMENT INC.

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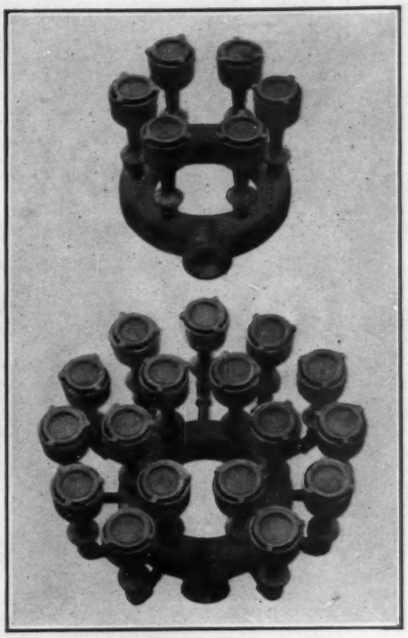
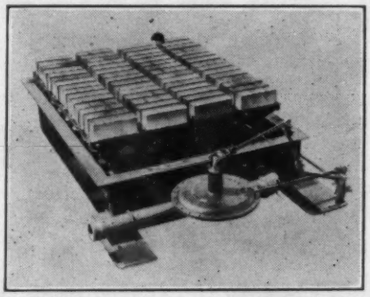
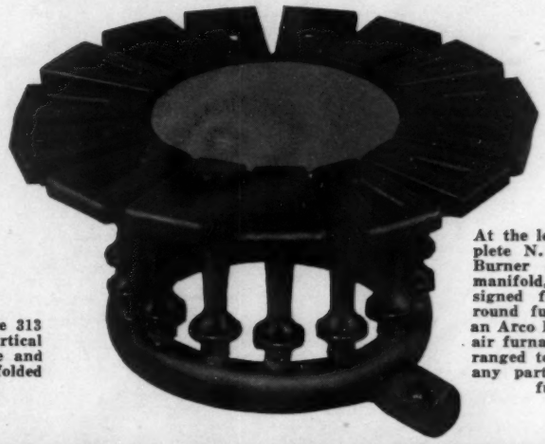


Above are shown two models of the N. G. E. Type 340 Gas Burner, meeting all requirements for firing small vertical boilers. Available with 8" and 10" manifold.

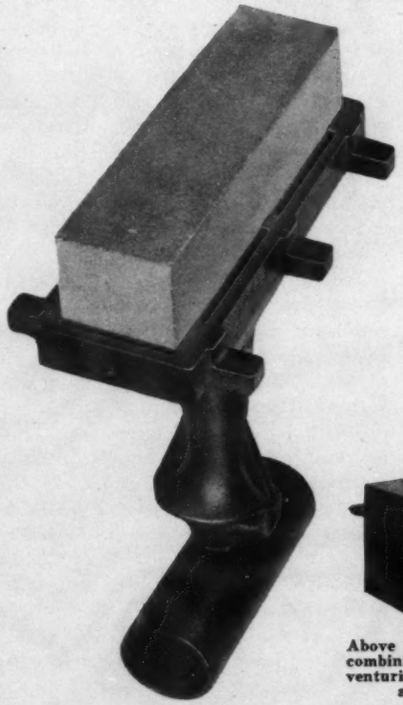


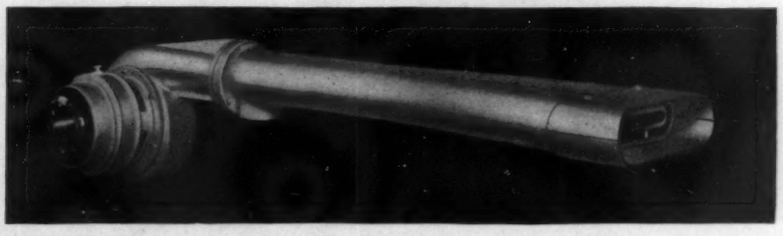
Above is illustrated the N. G. E.-Nelson Series 1000 Gas Burner for firing oil country locomotive type boilers. Requires no fire-box construction; ruggedly constructed for heavy duty; portable; develops maximum boiler capacity rating with low gas pressure.



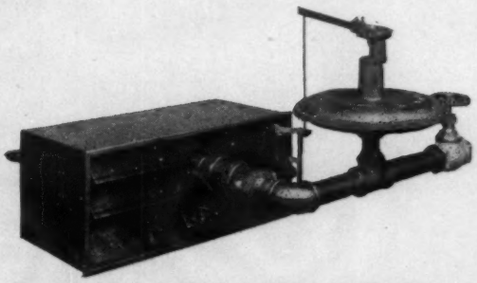
At the left is the complete N. G. E. Type R Burner on a circular manifold, specially designed for firing any round furnace such as an Arco Boiler or warm air furnace. Easily arranged to accommodate any particular size of furnace.

Below is illustrated the N. G. E. Type 313 Burner designed particularly for vertical firing in Birchfield, Pacific,-Kewanee and similar steel boilers. Can be manifolded parallel or at right angles.





Above is illustrated the N. G. E. Type G-A Bake Oven Burner, designed and developed for direct-fired bake ovens. Affords perfect combustion, uniform heat distribution, reduced fuel costs, cleanliness and safety.



Above is shown the N. G. E. Series 100 Gas Burner combining the best features of the multiple jet and venturi types. Automatic and accurate control of both air and gas is provided in this new unit.

LOOK TO THE PIONEERS FOR CONTINUED LEADERSHIP

NATURAL GAS PIPE LINE MILEAGE AND COMPRESSOR STATION CAPACITY

Reported as of 1936 for Principal Companies

COMPANY	MILES TRANSMISSION MAIN OPERATED—1936			COMPRESSOR STATION CAPACITY 1936
	Under 8-Inch	8-Inch and Larger	Total (All sizes)	(Installed B.H.P.)
Arkansas Louisiana Gas Co., Shreveport, La.	474	1,085	1,559	26,800
Canadian River Gas Co., Amarillo, Texas	15.6	86.3	101.9	3,000
Canadian Western Natural Gas, Light, Heat & Power Co., Ltd., Calgary, Canada	55.11	255.19	310.30	600
Carnegie Natural Gas Co., Pittsburgh, Pa.*			1,200	7,300
Central States Power & Light Corp., Tulsa, Okla.	309.44	61.65	371.09	850
Cities Service Gas Co., Bartlesville, Okla.	1,218.56	2,948.24	4,166.80	86,235
Coast Counties Gas & Electric Co., Santa Cruz, Calif.	39.28	20.33	59.61	
Colorado-Interstate Gas Co., Colorado Springs, Colo.	71.25	356.65	427.90	8,000
Columbia Gas & Electric Corp., New York, N. Y.*			13,000	200,000
Columbia Natural Gas Co., Pittsburgh, Pa.	223	47	270	3,500
Consolidated Gas Utilities Corp., Oklahoma City, Okla.	484	485	969	8,565
Consumers Power Co., Jackson, Mich.	113.6	124.5	238.1	
Dominion Natural Gas Co., Ltd., Buffalo, N. Y.	507	99	606	295
East Ohio Gas Co., Cleveland, Ohio	551.29	791.16	1,342.45	2,805
El Paso Natural Gas Co., El Paso, Texas	21.78	201.92	223.70	
Equitable Gas Co., Pittsburgh, Pa.	398.34	633.39	1,031.68	9,570
Finleyville Oil & Gas Co., Pittsburgh, Pa.	35.13		35.13	245
Hope Natural Gas Co., Pittsburgh, Pa.*			4,000	90,000
Houston Pipe Line Co., Houston, Texas		615.93	615.93	12,100
Industrial Fuel Supply Co., Los Angeles, Calif.		170	170	32,000
Interstate Natural Gas Co., Inc., Monroe, La.		265.33	265.33	14,200
Kansas Pipe Line and Gas Co.			290	
Kansas Power and Light Co., Salina, Kan.	567.16	614.37	1,181.53	10,075
Kentucky, Natural Gas Corp., Owensboro, Ky.	333.78	363.04	696.82	1,085
Kentucky-West Virginia Gas Co., Pittsburgh, Pa.	337	111.18	448.18	6,065
Lone Star Gas Co., Dallas, Texas	1,755	2,127	3,882	35,545
Lycoming United Gas Corp., New York, N. Y.*			200	300
Memphis Natural Gas Co., Memphis, Tenn.	37.26	332.47	369.73	8,180
Mississippi River Fuel Corp., St. Louis, Mo.*			700	38,000
Montana Dakota Utilities Co., Minneapolis, Minn.	306.57	775.21	1,081.78	2,860
Montana Power Gas Co., Butte, Mont.	40	366	806	
Mountain Fuel Supply Co., Salt Lake City, Utah	29.35	390.07	419.42	
Natural Gas Pipeline Co. of America, Chicago, Ill.		828.8	828.8	75,000
Nebraska Natural Gas Co., Salina, Kan.	109.15	143.61	252.76	
New York State Natural Gas Corp., Pittsburgh, Pa.		160	160	960
North Central Gas Co., Casper, Wyo.	111.94	145.52	257.46	1,320
North Penn Gas Co., Port Allegany, Pa.	286.6	108.6	395.2	4,702
Northern Natural Gas Co., Omaha, Neb.	755.48	1,394.31	2,149.79	25,980
Northern Utilities Co., Casper, Wyo.	98.11	118.94	217.05	
Northwestern Utilities, Ltd., Edmonton, Alberta		108.65	108.65	
The Ohio Fuel Gas Co., Columbus, Ohio	3,996.5	2,826.7	6,823.2	61,545
Oklahoma Natural Gas Co., Tulsa, Okla.	710.12	865.54	1,575.66	9,740
Pacific Gas and Electric Co., San Francisco, Calif.		548.37	548.37	5,320
Panhandle Eastern Pipe Line Co., Kansas City, Mo.*			1,600	14,000
Pittsburgh & West Virginia Gas Co., Pittsburgh, Pa.	566.92	696.58	1,263.50	26,620

*Figures are estimated totals.

(Continued on Page 56)

facilities of the Panhandle Eastern Pipe Line Co. It will be electrically welded and will cost about $2,200,000.

Kansas-Nebraska Activity

Among a number of lines scheduled for early construction the most imposing is the project of the Kansas Pipe Line & Gas Co. This company proposes to lay some 390 miles of transmission mains and laterals in the central and western portion of Kansas and in western Nebraska.

This activity is precipitated in part by the expiration on May 31 of this year of a lease on a portion of a Stanolind oil line which was reconditioned for carrying gas in 1931. At that time approximately 700 miles of Stanolind line extending from Welch, Wyo., across Nebraska and a part of Kansas to Freeman, Mo., was leased by the Kansas Pipe Line & Gas Co. and the North Central Gas Co. Kansas Pipe Line & Gas leased about 300 miles of the line between Keystone, Neb. and Freeman, Mo., with North Central leasing about 400 miles between Keystone and Welch, Wyo.

When the present project of the Kansas Pipe Line & Gas Co. is completed, the company will transport and distribute the gas in Kansas and will transport in Nebraska for distribution by the Nebraska Gas Fuel Co., a new firm organized in the latter part of 1935. Nucleus of this Kansas Pipe Line & Gas system consists of 13 towns in Nebraska, to be served by Nebraska Gas Fuel, which were formerly served from a section of the Stanolind line.

Work on the first leg of this system, 50 miles of 4-inch Dresser-coupled pipe from Ogallala eastward to North Platte in Nebraska was completed last month. This 50-mile section, together with about 100 miles that will be extended on eastward from North Platte to a point just west of Kearney, Neb., in the next leg of construction, parallels the Stanolind line. Ogallala is the westernmost community served from this portion of the Stanolind carrier.

All of the towns served through this 150-mile unit of the leased line will be connected to the new gas line. Kansas Power and Light Co. will provide a gas supply for this line temporarily, while Kansas Pipe Line & Gas Co. is building a line from Elm Creek, near Kearney, south to a gas field in Rush County, Kansas, a distance of about 170 miles. At the same time Kansas Pipe Line & Gas will serve towns in the Republican River Valley and north central Kansas as construction progresses.

The whole system will consist of 150 miles of 4-inch pipe and 240 miles of 6- and 8-inch pipe. As the distance from

Harold Mueller, president, L. J. Mueller Furnace Company, Milwaukee, Wisconsin, goes over the new Mueller line of Gas Era Furnaces, Boilers, and air conditioning equipment with Mr. A. L. McKinstry, prominent utility man.

PLAIN TALK BY HAROLD MUELLER

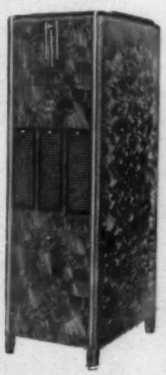
WHEN I was a little shaver running around my grandfather's furnace shop, he used to tell me, "Boy, if you build an honest product and sell it honestly, you'll never have to worry about keeping customers. Even if you have to charge a little more for good workmanship, your customers will remember quality long after they forget price."

That was a mighty good policy 79 years ago, and it's good today. It's like the constitution—a little old-fashioned, but still reliable.

Fundamentals don't change even though ideas and living standards do. In the seventy-nine years my family has been in the heating business a lot of changes have taken place. Why, in the last ten years alone, ideas about home heating have done a complete about face.

Homes built according to 1936 standards will completely outmode those of 1926. One major change is the public's opinion about heating. Today the call is for automatic heat and air conditioning.

Alert home builders know that modern heating and air conditioning systems are far ahead of the old-fashioned heating plants they have supplanted.



THE NEW MUELLER-AIRE—A great Load Builder—opens tremendous market among stores, shops, showrooms, garages, small factories, and other buildings which do not have a central plant. The Muelleraire is a gas-fired space heater, portable, and beautiful in appearance. We are mighty proud of this Muelleraire and its popularity. The Muelleraire heats, filters and humidifies the air and distributes it throughout the space by forced circulation. Floor-level return insures warm floors.

And that is where we fit in. During the last ten years our engineers have pioneered automatic heating and air conditioning. Today we are ready with a complete line of Climator equipment, Gas Era Furnaces, and the new Series A Gas Era Boilers for residences—all newly styled and attractively priced. Be sure to get all the facts about this new equipment—and of course we still continue to produce the standard line of Mueller registers and fittings.

Be ready for a big year in 1936. Come along with us. Write today.

H. J. Mueller

PRESIDENT

MUELLER-MILWAUKEE

PIPE LINE MILEAGE—COMPRESSOR STATION CAPACITY

(Continued from Page 54)

COMPANY	MILES TRANSMISSION MAIN OPERATED—1936			COMPRESSOR STATION CAPACITY 1936
	Under 8-Inch	8-Inch and Larger	Total (All sizes)	(Installed B.H.P.)
Peoples Natural Gas Co., Pittsburgh, Pa	250	303	553	32,300
Public Service Corp. of Texas, Fort Worth, Texas	195.26		195.26	
Rio Grande Valley Gas Co., Brownsville, Texas	67.6	139.4	207.0	
Southern California Gas Co., Los Angeles, Calif.	126.82	598.43	725.25	15,124
Southern Counties Gas Co. of California, Los Angeles, Calif.	5.8	227.2	233.0	4,740
Southern Fuel Co., Los Angeles, Calif.		212.03	212.03	
Southern Natural Gas Corp., Birmingham, Ala.*			1,200	17,000
Southern Union Gas Co., Dallas, Texas	523	307.3	830.3	
Southwest Gas Utilities Corp. of Oklahoma, Ada, Okla.	50	35.5	85.5	
Southwestern Light & Power Co., Lawton, Okla.	12	21.4	32.4	
Standard Pacific Gas Line, Inc., San Francisco, Calif.		201.72	201.72	
Texas Public Service Co., Austin, Texas*			130	
Texoma Natural Gas Co., Chicago, Ill.		75.1	75.1	
Union Gas Co. of Canada, Ltd., Chatham, Ontario	167.40	259.58	426.98	1,350
United Gas Public Service Co., Houston, Texas	1,451	3,525.6	4,976.60	54,760
West Texas Gas Co., Lubbock, Texas	386.35	406.51	792.86	
Western Gas Co., El Paso, Texas	91.90	495.19	587.09	2,280

*Figures are estimated totals.

Ogallala to the point near Kearney is approximately 150 miles, and the distance from Elm Creek to the Rush County field is about 170 miles, the balance of the total 390 miles takes care of laterals. The entire system will carry high pressure. Starting with service to 4,000 meters, it is designed to serve 15,000 in the territory covered.

L. E. Fischer is president of Kansas Pipe Line & Gas Co.; E. H. Holmes, vice-president, secretary, and treasurer; and George Burton, vice-president and counsel.

North Central Gas Co.

Longest of the natural gas transmission lines completed last year is the North Central Gas Co.'s 217-mile line from Clayton, Wyo., to Lewellen, Neb., bringing natural gas to a group of six towns in Wyoming and 13 in Nebraska. This line was finished about the first of December, 1935. It takes off at Clayton from the eastern terminus of the Northern Utilities Co. (formerly New York Oil Co.) line which draws principally from the Sandraw, Muskrat and Boone Dome gas fields in Wyoming. North Central's new carrier consists of 65 miles of 12-inch pipe, 56 miles of 10-inch and varying lengths of smaller sizes, and is designed to operate at a working pressure of 400 pounds per sq. in.

This project, like the Kansas Pipe Line & Gas Co.'s previously mentioned, was made necessary by the expiration of the company's lease on a portion of the Stanolind line.

The 56 miles of 10-inch pipe was reclaimed from a North Central Gas Co. line between Casper and Salt Creek, Wyo. An 18-mile section of 6-inch pipe also was reclaimed, from an oil line between Casper and Bolton Creek. The line is composite throughout, two 40-foot lengths being welded together with Dresser couplings at 80-foot intervals.

Consumers Power

New territory for natural gas was reached by the transmission line which has just gone in for Consumers Power Co. from the Hinton-Millbrook-Belvidere gas fields to Lansing, Michigan. Construction was begun about January 1 of this year and was carried through to completion last month despite a severe winter which impeded the field work. The line is 20 inches in diameter and 62 miles long. It will carry natural gas to Lansing, now served by Consumers Power with manufactured gas, and to some 25 towns supplied from the Lansing system. Plans are being completed for changing over the services and appliances of the 25,000 customers on the system. The change-over was to begin about May 1, to be completed with 60 days. Principal towns to be served natural gas out of Lansing are the following: Aurelius, Brighton, Charlotte, Eaton Rapids, Fowlerville, Grand Ledge, Haslett, Holt, Howell, Lake Chemung, Lake Lansing, Mason, Okemos, Portland, Webberville, Williamston, Hastings, Lake Odessa, Morgan, Mulliken, Nashville, Quimby, Sunfield, Vermontville and Woodland.

In addition to this extension the company laid 27½ miles of 6- and 4-inch lines during 1935. These lines carry natural gas to Bay City and Saginaw and to the company's Alma division, which serves the towns of Alma, Ithaca, St. Louis and Breckenridge.

City Gas Co. of London

City Gas Co. of London, Ontario, subsidiary of Union Gas Co. of Canada, Ltd., laid a line from the Dawn Field to London which was finished in the latter part of September 1935. It consists of 48 miles of 8-inch pipe. A gathering system in the Dawn Field and connecting lines at the other end of the carrier raised the new line total of this Canadian company by another 24 miles or more.

The main transmission line crosses the Sydenham and Thames Rivers. River crossing bends, etc., were welded and the balance of the line was Dresser-coupled. Approximate cost of construction and change-over work was $750,000.

108-Mile Texas Carrier

Early in 1936 the Lone Gas Co. completed its 108-mile, 20-inch line from Long Lake and Cayuga gas fields to Irving, Texas. All of the pipe going into this line, with the exception of 10½ miles of new pipe, was reclaimed from a line extending from Petrolia to a point near Fort Worth. The Long Lake Cayuga-Irving line supplements the company's supply coming into Dallas, tying into a main junction point at Irving which is near Dallas.

This line has a maximum daily capacity of 110 million cu. ft. More than 60 carloads of enamel pitch and more than 2,280,000 feet of 18-inch asbestos felt wrapper were required for its protective coating.

Western Gas Co. Addition

Late in February of this year Western Gas Co. ended construction work on a 45-mile 6-inch extension which takes off from the company's 10-inch El Paso-Phoenix transmission line near

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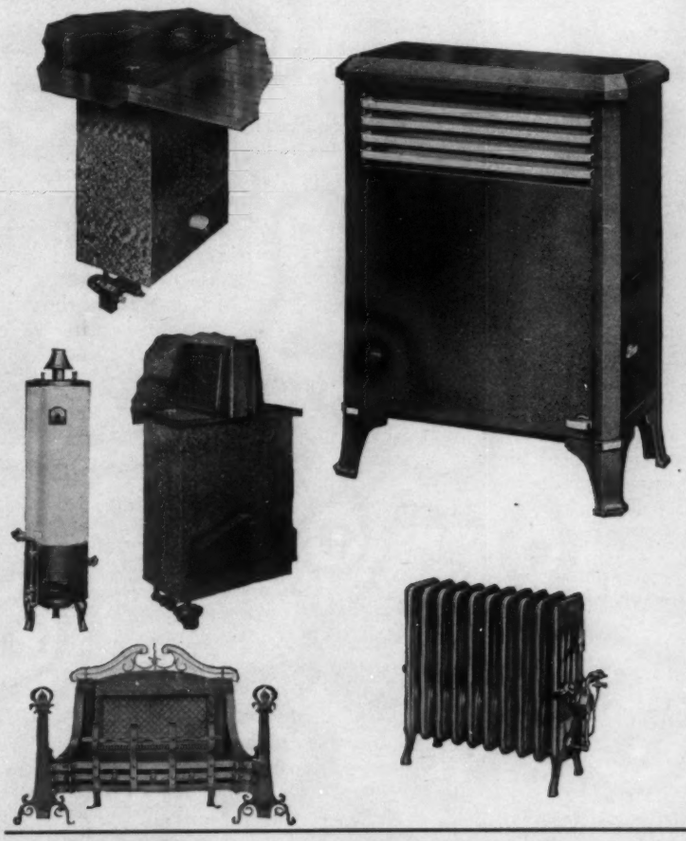

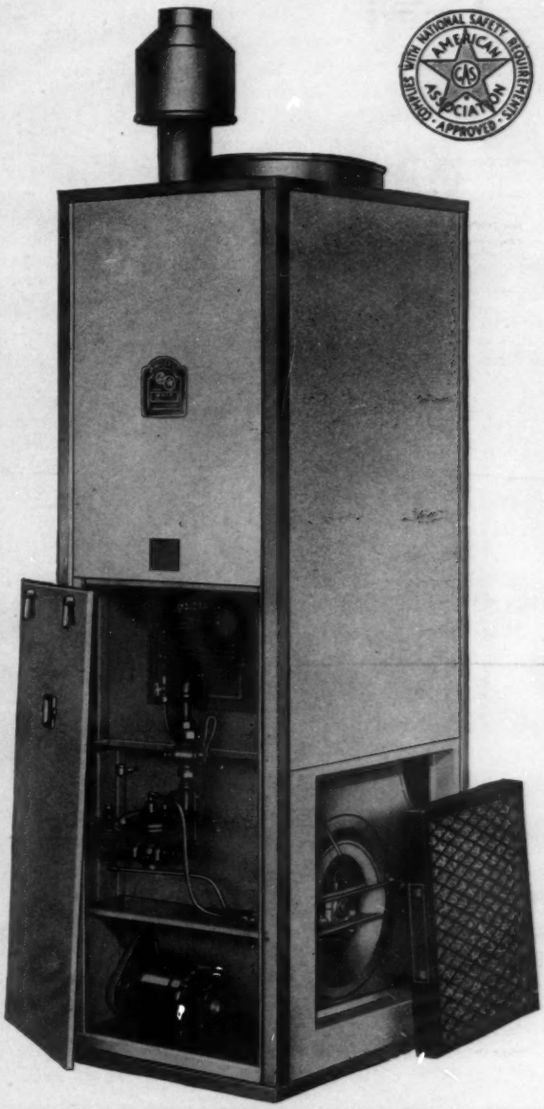

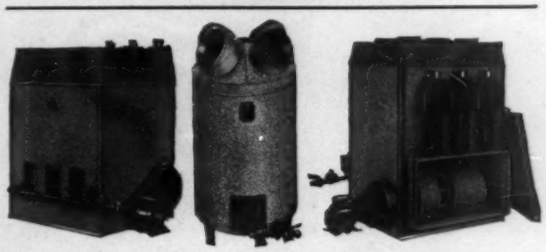

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Casa Grande, Ariz., and runs to a smelter at Superior, Ariz. For the first 17 miles from Casa Grande the line traverses an irrigated district, then follows U. S. Highway 180 over the mountains into Superior.

While the smelter constitutes the principal load of this line, the newly organized Natural Gas Co. of Arizona, headquartering at Superior, has laid spur lines from this carrier to serve the towns of Superior and Coolidge and proposes to serve the town of Florence, which is about 4½ miles from the carrier.

P. G. and E.'s Milpitas Extension

Pacific Gas and Electric Co., San Francisco, made an important contribution to 1935-1936 construction in its Milpitas-to-San Francisco line, described in detail on page 45 of this issue. This construction, most important undertaken by the company in recent years, represents a $1,650,000 addition to P. G. and E.'s transmission facilities.

Proposed Construction

C. H. Withers & Co., of Regina, Saskatchewan, proposes to lay a line from the Lloydminster Field to North Battleford, which will later be extended to Saskatoon. The distance from Lloydminster to North Battleford along the line route is approximately 78 miles. This first unit of line will be of 10-inch pipe, and it and the distribution systems in a number of towns along the route as well as that in North Battleford are planned to be completed by November 1 of this year. The second unit, from North Battleford to Saskatoon, a distance of about 85 miles, is set for completion by November 1, 1937.

A 1,500-mile line originating in Wyoming and Montana gas fields to extend eastward through North Dakota and Minnesota to Minneapolis and St. Paul, persistently rumored for the past few years, is now reported to have been taken under advisement by the National Resources Board to consider the possibility of financing the project with Federal funds. Principal talking point for the line is that the supply of natural gas that it would make available to points along the route through the Iron Range country would make possible the utilization of extensive low grade iron ore deposits in this region.

Although the foregoing review of recently constructed and proposed gas line enterprises is by no means inclusive, as it omits mention of many smaller extensions, it is sufficient to indicate a definite resumption in line building activity. Natural gas has by no means reached its frontiers.

Experiment in Reducing Gas Engine Piston Ring Temperatures

● **W. K. DODD, Southern California Gas Co.: addressing Pacific Coast Gas Association Technical Section Spring Conference, Los Angeles, Calif., March 26-27, 1936—(Abstract by GAS).**

SOUTHERN California Gas Co. has been experiencing trouble with sticking piston rings at its Ventura compressor plant, accompanied by large carbon deposits indicating temperatures in excess of the fire point of the lubricating oil in use. Seeking a means of reducing these ring temperatures, a series of tests has been made on the low stage piston of a 160 H. P. Cooper direct-driven two-stage compressor unit.

A piston of standard design was prepared with iron-constantan thermocouples installed in the center of the face, at the first or firing piston ring and at the fourth or last piston ring. The temperatures (Fahrenheit degrees) as shown in Fig. 1, were: Face, 690; first ring, 575; last ring, 320.

Next, a non-conducting disc of Transite was fastened to the face of the piston in an effort to reduce the quantity of heat entering. Temperatures were as follows: Face, 625; first ring, 475; last ring, 225.

A metal spray coating of aluminum was then tried on the face of the piston, with the following temperatures resulting: Face, 610; first ring, 475; last ring, 190.

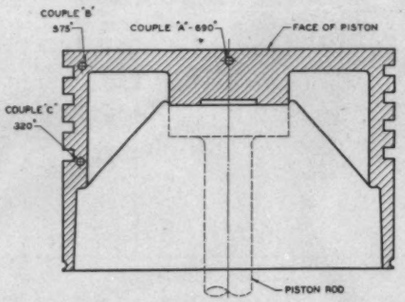

FIG. 1.

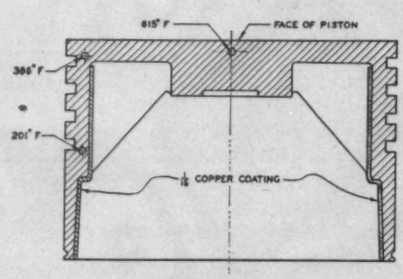

FIG. 2.

Next, a copper spider was fastened between the inside center of the face and the skirt at the lower ring, producing these temperatures. Face, 655; first ring, 415; last ring, 205.

The manufacturers were then requested to furnish a piston of sufficiently increased thickness at the firing ring corners to permit a greater flow of heat past that ring to the lower part of the skirt. This piston showed the following: Face, 630; first ring, 375; last ring, 232.

A standard piston was next metal-sprayed with copper to a thickness of approximately 1/16 inch on the inner surface, omitting only the inner surface of the face or head of the piston. It was desired to leave the temperature at the center of the face as it was, and to augment the flow of heat past the firing ring to the three remaining rings, making use of the high heat conductivity of copper. The temperatures obtained were: Face, 465; first ring, 402; last ring, 384. This showed considerable heat conduction by the copper, but too much heat removal from the center of the face.

The last experiment was to remove the copper from this last piston, except from the sidewalls, which were left coated, as shown in Fig. 2. As seen in this figure, the temperatures were: Face, 615; first ring, 386; last ring, 201.

It is thus indicated that heavier face and walls, or a copper coating as last described, produce considerably lower temperatures at the first or firing ring. Inasmuch as many of the gas engine oils marketed have a flash point of 375-385°F., and a fire point of 420-435°F., a low temperature firing ring is very desirable, and these tests indicate a means of improvement in design.

■ ■

To Acquire Control of El Paso Natural

Engineers Public Service Co., New York City, Stone & Webster subsidiary, late in April announced its intention to exercise an option to purchase a controlling interest in the El Paso (Texas) Natural Gas Co., according to El Paso press reports. The company now controls the El Paso Electric Co.

El Paso Natural owns the line bringing natural gas from the Lea County fields of New Mexico to El Paso, to supply Texas Cities Gas Co., serving El Paso, and the Arizona-Mexico system of the Western Gas Co.

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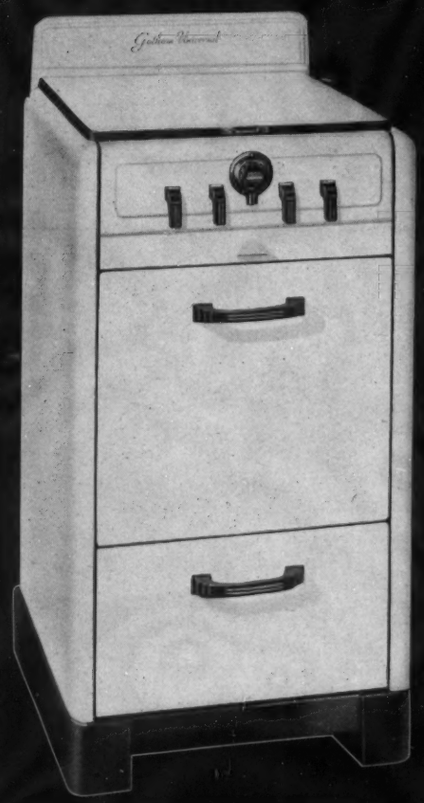

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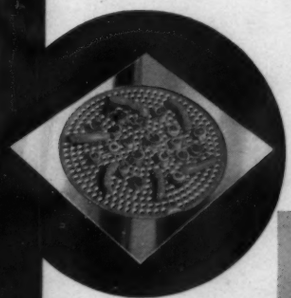
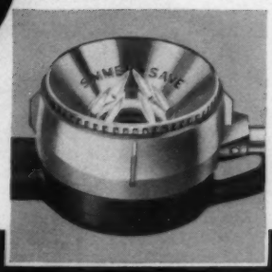


The Universal Savory Broiler Grid emphasizes the advantages of gas for broiling purposes.

Universal Ranges, regardless of type or size, are designed with one primary purpose—that is the promotion of the highest standard of cooking performance and the elevation of gas service to its highest plane of convenience, economy and modernity



The Universal Simmer-Save Burner brings to top burner cooking true controllability.

★ The Gotham Universal brings to the small compact kitchenette range a new modern styling that definitely places the Gotham in a niche by itself. The Gotham offers a cooking service that is comparable in every respect to the ultra-modern gas range. With its Simmer-Save Burners, Precision Oven and Savory Broiler Grid, it makes possible the most simple, certain and modern methods of cookery. The Gotham is a gas cooking appliance that emphasizes the desirability of gas as a cooking fuel. In every respect it is the ideal range for the kitchen where space is so limited as to not permit the installation of an average sized gas range.

The Petite Universal presents to the gas industry modernity in appearance plus the highest standard of cooking performance in a two-burner table stove.

The Petite is porcelain throughout, with two Simmer-Save Self-Lighting Burners, "Thriftop" and Lift-Up Cover. The Petite, as is true with all other Universal Ranges, emphasizes the superiority of gas as a cooking fuel.

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Range Investigation Points Way to Improvements in Performance

● **F. E. VANDAVEER, Supervisor, American Gas Association Testing Laboratories, Los Angeles, Calif.; addressing Pacific Coast Gas Association Technical Section Spring Conference, Los Angeles, Calif., March 26-27, 1936—(Abstract by GAS).**

EARLY in 1935 the Executive Board of the American Gas Association appointed a Committee on Domestic Gas Appliance Research with F. J. Rutledge, vice-president of the United Gas Improvement Company, as Chairman. It is the purpose of this committee to promote the technical advancement of domestic gas appliances as rapidly as possible in order to protect the existing domestic load and to place the industry in a better position to compete aggressively for new domestic business.

The first project sponsored by the Committee was an investigation of gas ranges and this was assigned to the A.G.A. Testing Laboratories. Work was started in Cleveland on June 4, 1935 under a schedule approved by the committee. Several engineers and chemists have been actively engaged on this assignment at the Cleveland Laboratory since that time.

Most of the work to date has been confined to determining the optimum performance of gas range oven, broiler, and top burner sections which could be attained as the result of minor constructional changes on ranges now being built.

From a study of the ovens of three ranges of widely different design it was found that:

1. Control of secondary air at the burner as well as in the flue outlet resulted in a saving of nearly 7 per cent in the amount of gas required to maintain the oven at 500° F.

2. Elimination of all possible metal-to-metal contacts between the oven linings and outer oven structure produced a saving of approximately 14 per cent.

3. Other features of range construction which could be improved and would produce desirable results are:

a. More direct application of heat from the burner to oven compartment.

b. Better continuity of insulation.

c. Tighter oven construction, particularly around the doors, oven top, and around main and sub-burner mixer heads where they go through side of oven.

In the study of broilers, six types were used. All of these appliances complied with the present A.G.A. requirements for broiling, and temperatures attained were adequate for broiling meats of medium thickness. Consequently, one basis of comparing them was the time to reach suitable broiling temperatures. At the end of 10 minutes heating, from room temperature, the following temperatures at the grill level were obtained:

Broiler with radiant screen burner	580° F.
Broiler with refractory radiant burner	645° F.
Broiler with yellow flame burner	720° F.
Conventional ranges with combination oven and broiler burners:	
No. 1	500° F.
No. 2	535° F.
No. 3	600° F.

On the top burner sections a great many alterations were tried but only the most promising are listed.

1. Better control of secondary air flow through the center openings of burners resulted in efficiency increases from 2.5 to 5.0 per cent, as well as improving the heat distribution.

2. Reduction of metal-to-metal contact and use of grates designed to increase heat transfer to the utensil resulted in substantial increases in efficiency.

3. As a result of numerous minor changes, possible thermal efficiency increases of nearly 28 per cent were indicated.

Research since October has been devoted to a study of individual factors more or less independent of practical precedents in range construction. It was found that air may be used effectively with solid insulating materials to permit an appreciable reduction in the amount of the latter used. Increase in speed and economy was obtained through proper employment of shiny heat-reflecting surfaces. Preheating times as low as 3 minutes have been found possible through increased burner input ratings under ideal conditions. It has further been found that the average A.G.A. approved range oven may be operated satisfactorily at inputs as much as 152 per cent above present nominal rating of 8,000 B.t.u. per cubic foot of oven content.

On top burners a thorough study of different sizes and types of burners at ratings from 6,000 to 12,000 B.t.u. is almost completed. Although the work is not finished, the results now indicate that 12,000-B.t.u. burners are not only capable of affording more speed but also better heat distribution, flexibility of performance, and more effective utilization of heat than regular 9,000 B.t.u. burners.

Photo-Electric Colorimeter for H_2S Determination

(Continued from Page 41)

enable the use of the colorimeter in the field. It consists of two tubes arranged in bridge formation as a vacuum tube volt meter.

In this arrangement the two grid circuits and two plate circuits act as the arms of a Wheatstone Bridge. As long as no current flows through the photo cell, the plate currents are equal and opposite so that points 1 and 2 are of equal potential and the output meter connected between these points registers zero.

Any light falling on the photo-cell will cause a push-pull change of tube grid voltage, resulting in a current flow through the meter proportional to the light flux. The amplifier is very sensitive, is lineal in out-put and is stable, being unaffected by small battery voltage fluctuations.

The meter is a Weston Model 600 DC 0 - to 200 micro-amperes range. A range multiplier increases the range to 1200 micro-amperes.

The liquid cell is made of Bakelite with two glass sides. The glass sides are made of large microscope slides and are cemented in place by Bakelite cement. The depth of liquid is approximately 7/8-inch. The cell slips into a housing between the light source and the photo-cell, through a light gate in the front of the instrument case.

The light source is a 32-candlepower automobile headlight bulb housed in a 2-inch brass tube. The lens system consists of two convex lenses so spaced as to give a parallel beam of light, which does not diverge appreciably before reaching the photo-cell. A light filter is placed immediately in front of the lens, allowing only a band of blue light of from about 4200 to 5400 Angstrom

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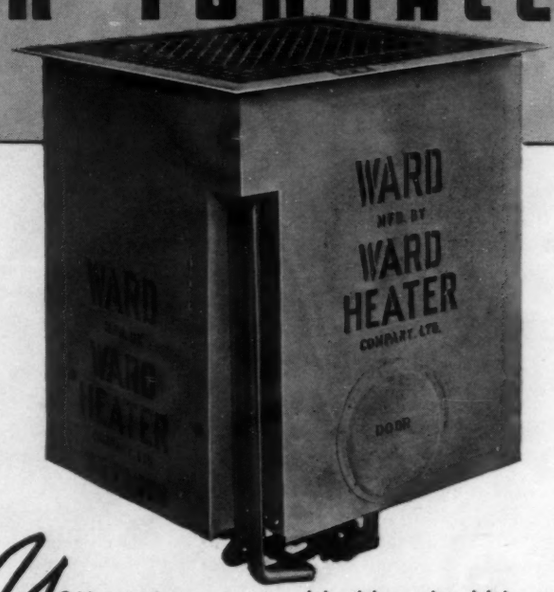

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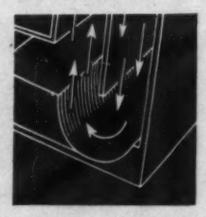

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units to pass. This is necessary for proper sensitivity.

The light intensity may be controlled through two rheostats in parallel. A test meter can be used either to check the voltage applied to the light source or to the tube filaments.

The colorimeter was calibrated on the basis of an arbitrary light zero of 600 micro-amperes with the liquid cell removed.

In practice, the solution obtained from the test is poured into the cell and the light zero adjusted by controlling the voltage to the lamp. The liquid cell is then placed in the housing and the output read from the meters, and translated by a calibration curve reading from 0.0005 to 0.0100 grains of sulphur.

The necessary glassware, solutions, etc., are transported in two easily carried boxes. The colorimeter proper is housed in a case, 10 by 12 by 12 inches in size, while power may be obtained from either a specially carried storage battery or from the regular automobile storage battery.

The advantages of the photo-colorimeter over any other method are: Sensitivity as low as .0005 grain may be detected; from 1 to 5 hours only is required for test; several absorption sets may be run simultaneously in the field without the continuous attendance of the operator; final determination can be made in the field rather than in the laboratory.

Apartment House Gas System Design

(Continued from Page 32)

plotted points in Fig. 2 represents either Equation 3 or 4.

To develop a curve that will be between the upper limit of design load (Equation 4) and the maximum observed demands, the following expression may be written which seems to satisfy the conditions:

$$x = 140Y - \tfrac{1}{2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Fig. 2 pictures the relation between this expression and Equation 4. Fig. 1 shows that in no case was an experimental observation obtained which came more than reasonably close to the equation.

A general equation may now be written which should serve as an easy and practical method of estimating the design load for apartment house buildings having individual cooking and space heating:

$$D_a = 140\sqrt{U} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

where,

D_a = Design load for entire apartment house in cubic feet per hour.

U = Number of units or apartments in the apartment house.

The particular value of Equation 6 is that it may be used before the actual construction work and the furnishing of the building are completed, and when there is no way of ascertaining the number and kind of appliances which will be installed. It is only necessary to know how many apartments the building is to contain. For example, if the apartment house was to have 49 apartments, it would only be necessary to extract the square root of 49, which is 7, and multiply by 140, which is 980. The service, meter, and regulator, therefore, are designed to supply a maximum demand of 980 cubic feet of gas per hour.

An actual apartment house in Los Angeles, Calif., has 92 apartments, 204 appliances, and a rated connected load of 4,673 cu. ft. per hour. During the month of January, 1936, it consumed 420,500 cu. ft. of gas. The design load may be estimated by dividing the monthly consumption by 240 (peak hour factor method), or by applying Equation 1, or by applying Equation 6. Table No. 1 shows the various results:

TABLE NO. 1. Comparison of Design Loads Calculated by Different Methods

	Cu. Ft. Per Hour
Rated Connected Load	4,673
Design Load (1)	1,995
Peak Hour Factor (240)	1,750
Design Load (6)	1,345
Highest Observed Demand	1,029

Table No. 1 exposes the folly of designing facilities to meet the full rated connected load. It indicates the excessive safety in previous methods of estimating the load, and shows that the method proposed under Equation 6 draws as fine a line between excessive capital investment and actual demand as sound engineering practice will permit.

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6. "Distribution Design," Proceedings P.C.G.A., Vol. 23, p. 451.

Tinsley Appointed House Heating Superintendent

IN recognition of his outstanding ability as a house heating salesman, S. J. Tinsley has been appointed superintendent of the house heating division of the Public Service Co. of Colorado, Denver. He succeeds F. Marion Chelf who was recently put in charge of the company's commercial gas division.

S. J. TINSLEY

Mr. Tinsley is a native of Pennsylvania and a graduate of Beaver College in Pittsburgh. Fifteen years ago he came to work for the Public Service Co., of Colorado, starting in the contract department. Two years later he became a house heating salesman and has led the sales almost from the first. When the company made a survey of Mr. Tinsley's territory a few years ago, it was found that he had 990 all-gas house heating jobs in operation, which is nearly 60 per cent saturation in a community where locally mined cheap coal is available.

■ ■

Revised A.G.A. Modern Kitchen Handbook

The manual "Modern Kitchens—A Handbook for Design and Construction," sponsored by a former modernization committee of the American Gas Association, is now being revised and brought up to date and will be released from the press in the near future.

The present Home Modernization Committee, working on the project with John West, Jr., secretary of the A.G.A. Commercial Section, is chairmaned by Harry Swenson. Other members are E. J. Devlin, E. Robin Little, A. G. Schroeder and George Ostlund.

■ ■

Converse Addresses A.P.I.

E. M. Converse, vice-president of the Dearborn Chemical Co., Chicago, delivered an address before the Panhandle Chapter of the American Petroleum Institute at Pampa, Texas, on April 14. His subject was "Corrosion Problems in the Oil Industry and Fundamentals of Protection."

■ ■

R. E. Taylor to Iowa City

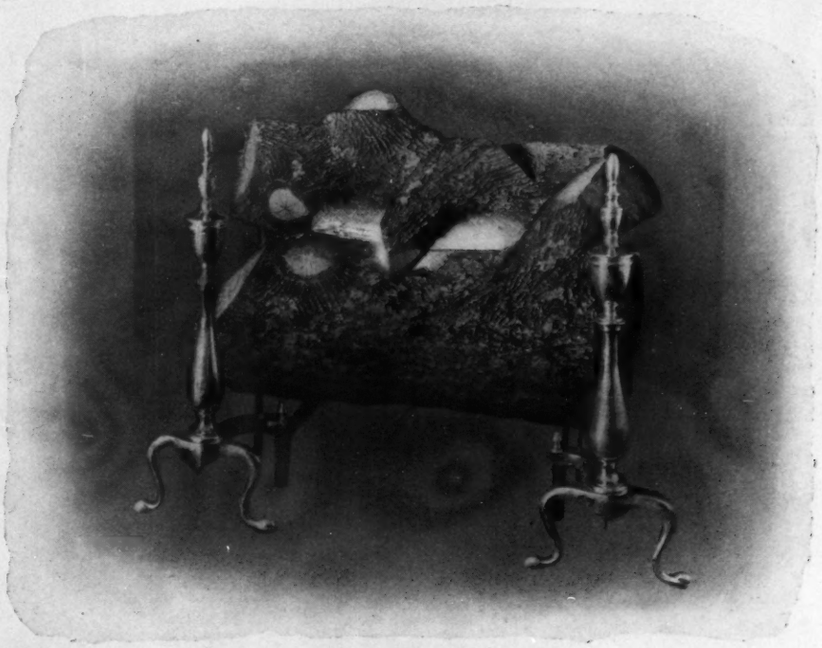
R. E. Taylor, general manager of the Ottumwa (Iowa) Gas Co., has been appointed vice-president and general manager of the Iowa City (Iowa) Light and Power Co. George G. Holmes, superintendent of distribution for LaPorte (Ind.) Gas and Electric Co., succeeds Mr. Taylor.

■ ■

Donaldson, Newby Shifted

S. S. Donaldson, Southern California Gas Co. transmission superintendent of the Kern Division at Taft, Calif., was recently transferred to Newhall, Calif., as division manager. A. B. Newby, division superintendent at Newhall, was transferred to Taft as division manager of the Kern Division.

A New Page in Gas Heating History



FIREPLACE LOAD BUILDING WITH

GLO-FIRE®

THE APPROVED ODORLESS GAS LOG

Unparalleled efficiency is obtained through the radical departure in gas heater design. Combustion takes place in two stages. The first, inside the lower log heating the interior ceramic walls and baffles to incandescence, while drawing in a stream of pre-heated secondary air. As this mixture of otherwise wasted by-products of combustion impinges on the glowing incandescent surfaces of the log, the second combustion takes place, utilizing to the last particle every B.t.u. of input, thus assuring a perfect odorless operation.

ODORLESS EFFICIENT
BEAUTIFUL CIRCULATING HEAT

Mr. Robert Clar will be at the Adolphus Hotel in Dallas during the Convention, where the Glo-Fire Log will be on display.

In two sizes—24 inches long. Hourly input 28,000 B.t.u.
20 inches long. Hourly input 17,500 B.t.u.

AMERICAN GAS ASSOCIATION · APPROVED · CONFORMS WITH NATIONAL SAFETY REQUIREMENTS

EXCLUSIVE DISTRIBUTORS

COLONIAL SHOPS

Distinctive Fireplace Fixtures

GLO-FIRE SALES DIVISION

3350 WEST FIRST STREET LOS ANGELES, CALIFORNIA

PHILLIP G. GOSSLER

EDW. REYNOLDS, JR.

WALTER C. BECKJORD

Columbia G.&E. Officers Step Up

AT A RECENT meeting of the board of directors of Columbia Gas & Electric Corp., Edward Reynolds, Jr., executive vice-president, was elected president, succeeding Phillip G. Gossler who was elected chairman of the board, and Thomas B. Gregory, senior vice-president, was elected honorary vice-president. Walter C. Beckjord, vice-president and general manager, retains his former post and in addition was appointed chairman of the executive committee and designated as chief operating officer.

Mr. Gossler was born in Columbia, Pa., in 1870, and studied electrical engineering at Pennsylvania State College and Columbia University. Since 1912 he served as chairman or president of the Columbia Gas & Electric Co., W. Va., until the transfer of that company's business in 1926 to the present Columbia Gas & Electric Corp., of which he has been president up to his recent election.

Mr. Reynolds was born in Boston in 1894, and upon graduation from Harvard College in 1915, entered the employ of Stone and Webster. Resigning in 1917, he enrolled in the U. S. Naval Reserves. Upon his return from service in 1919, he joined the Guaranty Trust Co. of New York in the bond department which later became Guaranty Trust Co.'s affiliate, the Guaranty Co. of New York. Mr. Reynolds became treasurer and assistant secretary of the Columbia Gas & Electric Co. in 1922 and later vice-president. Upon the merging of that company and the Ohio Fuel Corp. in November 1926, he became secretary and treasurer of the new company, Columbia Gas & Electric Corp. In April 1928 he was elected vice-president and secretary, and in April 1930, executive vice-president and secretary. In April 1935 he ceased to hold the office of secretary; and on April 2, 1936 was elected president. As president Mr. Reynolds continues as chief financial officer of the corporation.

Mr. Beckjord joined Columbia Gas & Electric Corp. in 1934 as vice-president and general manager, having formerly been with the Koppers interests.

Nashville "Dream Kitchen" Contest

NASHVILLE (Tenn.) Gas and Heating Co. with the cooperation of several manufacturers and dealers, opened a letter writing contest on March 22 to run until May 30, the winner to receive a $700 "Dream Kitchen." The letter must deal with how the contestant would apply this kitchen to his home, its usefulness to him, what he thinks of the Dream Kitchen and any other suggestions pertaining to such a modernization of his home.

To compete for the prize, each contestant must fill out a registration blank which must either be delivered in person or mailed to the company. In addition to the applicant's name and address, the blank calls for the following information: whether he is building a home, remodeling a home, whether he desires information on F.H.A. financing for building, remodeling or buying, and whether he is interested in having information on any of the materials or appliances making up the Dream Kitchen. This blank comprises the lower portion of a sheet containing the instructions and rules of the contest. The part with the instructions is retained by the contestant and bears a number corresponding to one appearing in the upper right hand corner of the registration blank. In submitting his letter the contestant does not sign his name but identifies the letter by the number. Anyone wishing to enter the contest must call at the company office to secure a registration blank.

In setting up the contest, Nashville Gas and Heating Co. secured the cooperation of several manufacturers and dealers to contribute the appliances, materials and work going into the Dream Kitchen, and they installed them in one of the company's display windows. The installation consists of modern kitchen cabinet work, decorating effects, kitchen sink, Carrara glass paneling, gas range, gas refrigerator, gas water heater and linoleum floor covering, with the company contributing the water heater and refrigerator.

The manufacturers and dealers also agreed to participate in paying a major portion of the cost of advertising the contest. The advertising campaign calls for the use of an average of one 60-inch newspaper advertisement per week, alternating in Nashville's two daily papers. Spread out over the 10-week period of the contest, appliance and advertising costs to each of the participants amount to very little, and the effort is proving successful. People are coming in to the company exactly as hoped, a few each day, which gives ample time for going through a promotional talk, to which job one of the company's domestic salesmen is assigned each day.

■ ■

Fulton Municipal System Contract Awarded

According to J. W. Cook, Jr., city engineer, the city of Fulton, Mo., has awarded a contract for the construction of a municipal natural gas distribution system at a contract price of $47,767. The system will tie into the Panhandle Eastern Pipe Line Co. carrier through a spur line which was constructed some 4 years ago to supply a fire brick plant at Fulton. The distribution system will consist of 6,900 feet of 6-inch mains, 21,850 feet of 4-inch and 15,825 feet of 2-inch.

Delivery of gas is expected to start with 200 to 300 customers and a final saturation of about 900 is anticipated.

■ ■

London Distributor Named for Barber Gas Burners

The Barber Gas Burner Co., of Cleveland, Ohio, has appointed Arthur Docking & Co., of London, England, to represent its complete line of industrial and commercial gas burners in England. A letter to *GAS*, received last month from Harry E. Kerr, president of the Barber company, from London, states that he is especially pleased with initial orders from appliance manufacturers and utilities in England. He also comments favorably on the aggressive load building campaigns which the nine London gas companies have under way.

Mr. and Mrs. Kerr returned to the States late in April. Their trip to England followed their recent marriage in Los Angeles.

■ ■

Committee Formed to Study Grounding of Electric Lines

At a recent meeting in New York, attended by representatives of 17 organizations, among them the American Gas Association, a joint American Research Committee on Grounding was formed. The Committee will undertake a study of practices and results of grounding electrical lines, particularly to gas and water pipes.

H. S. Warren, director of protection development with the Bell Telephone Laboratories, was elected chairman of the Committee. Chas. F. Meyerherm, president of Albert F. Ganz, Inc., New York, was elected secretary-treasurer.

■ ■

Surveys Reveal Large Potential Chicago Market

Surveys conducted recently in Chicago reveal that there are 480,000 Chicago families without mechanical refrigeration and that there are 300,000 families with electrical refrigerators. Tank water heaters are still used by 250,000 Chicago families, and 800,000 ranges without modern gas range features are still in use.

LOOK AT ALL NINE

Then Ask Yourself This Question:

"WHAT OTHER GAS RANGE LINE CAN GIVE ME SO MUCH TO TALK ABOUT?"

Look at those nine sales clinchers—check them, one by one, against *any* other Gas Range. Look at the super-smart styling of the 1936 Estate. Look at its practical, years-ahead cooking advantages. Look at Estate's national reputation—its regular advertising push in the big-time magazines. Then ask yourself: "What other Gas Range line can put so much money in my pocket as the smart 1936 Estate?"

1. FRESH-AIR OVEN
2. AUTOMATIC TIME CONTROL
3. AUTOMATIC LIGHTING
4. WAIST-HIGH BROILER
5. GRID-ALL
6. LEVERACKS
7. TWO HINGED COOKING TOP COVERS
8. NEW SPEED-WELL COOKING TOP
9. SPIRAL BOUND RECIPE BOOK

The ultra-modern No. 545 Estate Gas Range, shown with De Luxe Mantel Back and leg base. Chromium ornamentation. New plastic salt and pepper shakers are standard equipment.

THE ESTATE STOVE COMPANY · HAMILTON, OHIO

Warehouse Stock in LOS ANGELES, SAN FRANCISCO, PORTLAND, MINNEAPOLIS, DALLAS

Billboard appeal for Gas Appliance Society of California current range campaign

"A Corsage For Your Kitchen"

"A CORSAGE for Your Kitchen" is the theme of the spring gas range campaign of the Gas Appliance Society of California, running from April 25 to May 2 inclusive. The campaign appeal is built about the idea of a spring showing of a new style and beauty in kitchen ranges.

As a special inducement to "buy now," a $16 discount is offered to apply only on sales made from April 25 to May 2. During this week an intensive advertising campaign is carried on by the society through a number of mediums.

There will be a week of intensive radio broadcasting, with more than 200 spot announcements. A thousand 20- by 30-inch display cards are distributed for display by dealers. Forty-five inches of newspaper advertising is carried in the dailes and 24 inches in weeklies. A two-page clip sheet of publicity stories is sent to all papers, and offer is made of free mats for illustrations. One hundred eighty-five billboards carried the message to Northern and Central California during the month of April, and the Pacific Gas and Electric Co. will use miniatures of the billboard for stickers on 500,000 gas bills. Colorful slides of the same design as the billboard are showing in moving picture theatres. Floor displays of ranges will be featured in P. G. and E. offices in more than 50 towns and cities throughout Northern and Central California.

Dealers all over the territory are tying in their newspaper advertising, using the slides, posters, display cards, newspaper mats, and other material prepared and distributed free by the society. Thy are also tying into the campaign with their own direct mail, radio, floor, and window displays.

Sales for the month in which campaign week was held during three previous years, were as follows:

1933	2,586
1934	3,244
1935	4,147

It is expected that this campaign will result in the sale of between 5,000 and 6,000 ranges.

"Oil & Gas Equipment Review"

SELECTED list of 15,000 operating men in the oil and gas industry last month received copies of a new monthly periodical, "Oil & Gas Equipment Review." Western Business Papers, Inc., publishers of *GAS* (formerly *Western Gas*), and of the Handbook of Butane-Propane Gases, are publishers of the new medium.

"Oil & Gas Equipment Review" is something new in the way of a publication service. Its editorial contents consist almost entirely of new equipment descriptions, and its sole mission is to keep operators informed on the latest devices and services for the advancement of their craft.

Seventy-five different items of equipment directly applicable to oil and gas industry operations were announced in the first issue. Editorial descriptions are limited to new products or improved models of already established lines.

Circulation of the magazine is on a controlled basis. Anyone in the operating branch of the gas industry who is interested in receiving copies regularly may do so without cost, by making written request to the publisher, Western Business Papers, Inc., 810 South Spring St., Los Angeles, Calif., or 122 South Michigan Ave., Chicago, Ill.

■ ■

What Is This Natural Gas Industry?

(Continued from Page 12)

40,000 miles of trunk lines were included in the industry's service facilities. This total is now probably closer to 50,000 miles. A survey conducted by *GAS* among larger pipe line companies, and published elsewhere in this issue, lists more than 3,000 miles of new line laid in the last five years.

On the production side, the Bureau reports 53,260 gas wells working at the end of 1934, with A.P.I. releases showing 1,401 wells drilled last year. Total production, estimates the Bureau, reached 1,875,000 MM c.f. in 1935.

Company-Dealer Sales Survey—1935

(Continued from Page 25)

est in themselves as a record of local load-building accomplishments.

Especially significant is the showing on average sales prices for the various appliances. It is evident that a gas range of quality much superior to that sold even four or five years ago is now getting the emphasis on many properties. Automatic water heaters, too, are commanding a larger place in the load-building program on most systems.

Companies were requested to give their unit sales prices on an uninstalled basis, whenever possible, and the figures returned were assumed to be "uninstalled" except where specifically noted otherwise.

In reporting unit prices, it has been necessary to eliminate final figures in the "cents" column, and the prices shown have been raised in some cases because of this fact.

From the 1935 sales recorded for individual companies in the tables, totals have been accumulated as shown below. Since a few companies have not included dealer figures in their reports the totals do not do complete justice to the appliance volume obtained. Also it should be noted that in some cases companies have not reported sales for certain appliances, which makes the totals less than actual sales in these classifications. Refrigerator sales, for example, were appreciably more than the total here recorded.

TOTAL SALES REPORTED

Ranges	410,835
Hot plates, laundry stoves	11,676
Automatic water heaters	158,426
Non-automatic water heaters	32,428
Refrigerators	67,484
Space heaters	283,254
Central and unit furnaces	21,919
Floor furnaces	18,900
Furnace conversions	17,836

Cooperation of the many individuals who have returned information for use in the accompanying tables is acknowledged with appreciation.

■ ■

Davies to Represent Ward in Chicago

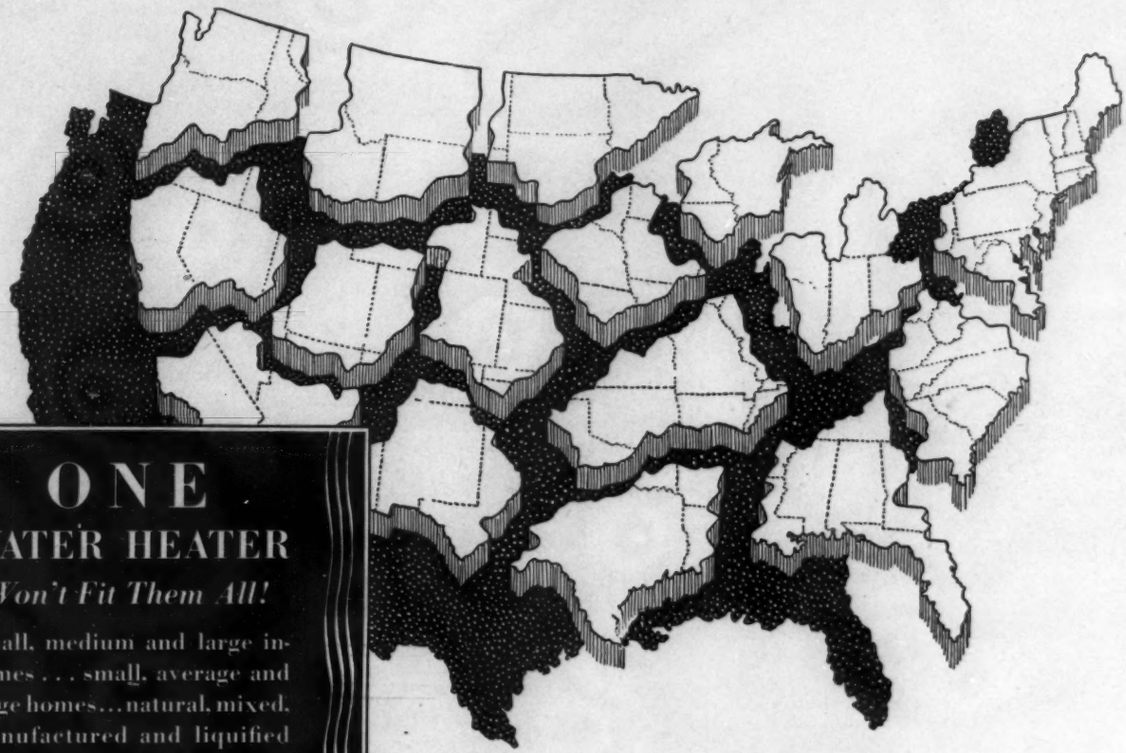
J. E. DAVIES

WARD Heater Co. Ltd., Los Angeles, has completed arrangements with J. E. Davies for representing the Ward line of floor and unit furnaces and circulators in Chicago. Mr. Davies is well known in the industry, having formerly been associated with the Peoples Gas Light and Coke Co., Chicago, for a period of 40 years, a large part of the time as manager of the merchandising department.

Mr. Davies will maintain his Chicago headquarters in the Peoples Gas Building.

RUUD

IS LOW-PRICED



ONE
WATER HEATER
Won't Fit Them All!

Small, medium and large incomes . . . small, average and large homes . . . natural, mixed, manufactured and liquified petroleum gases . . . hard and acid water . . . one, five, ten and a hundred faucets.

No matter where you are located, RUUD has the gas water heater that fits your selling and operating conditions. Check the RUUD line for this unit . . . and when you find it, make it your front-rank seller.

You know in advance that it's LOW-PRICED!

H. R. BASFORD COMPANY
665 Howard Street
San Francisco, Calif.

RUUD WATER HEATER COMPANY
2018 Jackson Street
Dallas, Texas

J. H. FAGAN COMPANY
161 W. Wisconsin Avenue
Milwaukee, Wisconsin

H. R. BASFORD COMPANY
911 S. Grand Avenue
Los Angeles, Calif.

WM. A. FLATT COMPANY
1031 Santa Fe Drive
Denver, Colorado

EARL G. BURWELL
Casper, Wyoming

NORTHWEST GAS & ELECT. EQUPT. CO.
Public Service Building
Portland, Oregon

RUUD MANUFACTURING COMPANY
820 Carondelet Street
New Orleans, Louisiana

ROBT. THOMPSON
1906 Washington Avenue
St. Louis, Missouri

RUUD MANUFACTURING COMPANY..Factory at Pittsburgh, Pa.

LOW PRICED NEW MODELS

Chicago Service Information Plan Simple in Operation

By CRAIG ESPY

Mid-Western Manager, GAS

IN order to provide employees with a convenient plan for getting information for themselves and for helping customers get correct information and good gas service, the Peoples Gas Light and Coke Co. put a Service Improvement and Employee Information plan into effect in September 1934.

Announcements of the plan mentioned the many questions that were asked of employees which they might oftentimes not be able to answer, and asked them to keep a booklet that contained Service Improvement and Employee's Information Tickets, provided under the plan, ready for instant use. The booklet, containing 12 information tickets, is of such size that it slips easily into a man's pocket or a woman's purse. The covers carry printed information about the operation of the system and pertinent facts about gas service.

Employees were asked to write their own names on the outside of the booklet and whenever a customer had a question that could not be answered fully, a service request or a grievance, he was to produce the booklet and offer to get more information or proper service from the gas company.

The Information Ticket carried spaces for the customer's name, address, telephone number and space to relate the exact information wanted or to expound the service detail that required attention. It could also be used by employees to ask their own questions.

During the first year of the operation of the plan, 500 tickets were turned in to the Training Division of the company, operating under the supervision of Jay Barton. Two hundred and one of the questions had to do with appliances, their delivery, installation and pick-up, operating cost, how they operate, replacement and parts, and sales and servicing.

The subject of "Bills" netted 127 questions, these having to do with delivery, bill complaints and questions about the customer's account. Gas service and utilization drew 8; policies of the company, 43; gas rates, 33; company routines, 21; production and storage of gas, 3; transmission and distribution of gas, 47; miscellaneous, 13.

Employees of the finance group of the company, representing the budget department, bill delivery department, correspondence department, credit and collection department, customers' order department, meter reading department and other classifications accounted for 282 of the questions. The Sales group followed with 70, the Accounting group, 51, Operating group 48, Public and Industrial Relations group, 20, Research and Testing, 26.

Typical questions are How much money would be saved should the top lighter of the gas range be disconnected? How much gas does the Electrolux use in 24 hours? What percentage of a customer's gas bill covers water heating service and how much gas should a family of 5 consume in water heating? In case the pilot light on the house heating appliance is blown out is the gas burner automatically shut off? Why not install a damper in a flue pipe to prevent heat from going up the chimney? Is it advisable to drain piping in a hot water heating system? Is it all right to paint meter same color as wall?

According to routine, the employee originates the ticket and sends it to the Training Division. There it is given a control number and entered on a running record. The supervisor decides where it shall be sent for an answer. The ticket is typed on report sheets in duplicate, the duplicate being placed in the pending file, and the original sent out for action or answer. After the customer's request has been taken care of, or the employee's question is answered, the report is sent back to the Training Division. Here the answer is typed on the duplicate copy, which is sent to the employee originating the ticket. The name of the employee is never used in referring a customer's request or in obtaining an answer to the employee's question.

Today the Service Improvement and Employees' Information plan operates almost automatically and requires no special promotion except a brief write-up each month in the "Peoples Gas Club News," company house organ.

Bartlett Made Sales Manager Oklahoma Natural

THOMAS E. BARTLETT, for the past four years dealer cooperative representative and sales supervisor of Oklahoma Natural Gas Co., was recently appointed to the post of sales manager. In his new capacity Mr. Bartlett will have change of home service and advertising as well as of sales.

T. E. BARTLETT

Mr. Bartlett is a graduate in engineering of Drexel Institute in Philadelphia. His first four years in the gas industry were spent as purchasing agent with the Virginia Public Service Co. at Alexandria, Va. Following this he was commercial manager for five years for the Florida Power Corp., St. Petersburgh, Fla. Mr. Bartlett then acted as manager of sales with offices in San Francisco for Natural Gas Properties, Inc., operators of liquefied petroleum gas properties in a number of communities in California, Oregon and Washington. After one year with this company he joined the Pacific Heating Co., dealing particularly with central house heating plants, and a year later, in July, 1932, went with Oklahoma Natural.

■ ■

Couzens Rejoins Staff of Cleveland Laboratories

W. M. Couzens recently rejoined the staff of the American Gas Association Testing Laboratories in Cleveland in the capacity of assistant chief engineer. Prior to December, 1933, Mr. Couzens had served with the Laboratories for a period of over seven years, during which time he was engaged in various capacities, including those as supervisor of the Pacific Coast Branch Laboratories and as head of the research department at Cleveland.

Starting as a testing engineer in 1926 at the Cleveland Laboratories, after graduation from Tri-State College, Angola, Ind., Mr. Couzens was soon assigned to research work, principally in the field of gas mixing, and in 1928 was appointed chief inspector. In 1930 he was chosen to organize the first branch Laboratory in Los Angeles. In February, 1933, Mr. Couzens exchanged posts with Dr. F. E. Vandaveer, supervisor, and returned to Cleveland to manage research activities.

■ ■

Crowley Conducts Lectures

W. J. Crowley, rate engineer in the general office statistical department of the Public Service Co. of Northern Illinois, has been selected lecturer for night classes of the School of Commerce of Northwestern University. He conducts one class a week on public utility rate structure the enrollment in which is made up largely of public utility employees.

■ ■

McKenzie Joins Dresser

S. T. McKenzie recently joined the field organization of the S. R. Dresser Manufacturing Co., Bradford, Pa., and is at present covering the flood-stricken areas in and around Hartford, Conn., and Williamsport, Pa. Mr. McKenzie has had wide experience in the sale of valves, pipe joints and allied products. His present operations will be confined largely to the New England States.

■ ■

Kansas Franchises Purchased

Franchises for serving natural gas in the towns of Pineville and Middlesboro, Kan., are reported to have been purchased by J. E. Kelly, of New York, and W. T. Livey, of Charleston, W. Va. It is understood that the purchasers propose to serve the two towns from wells located in Knox County.

■ ■

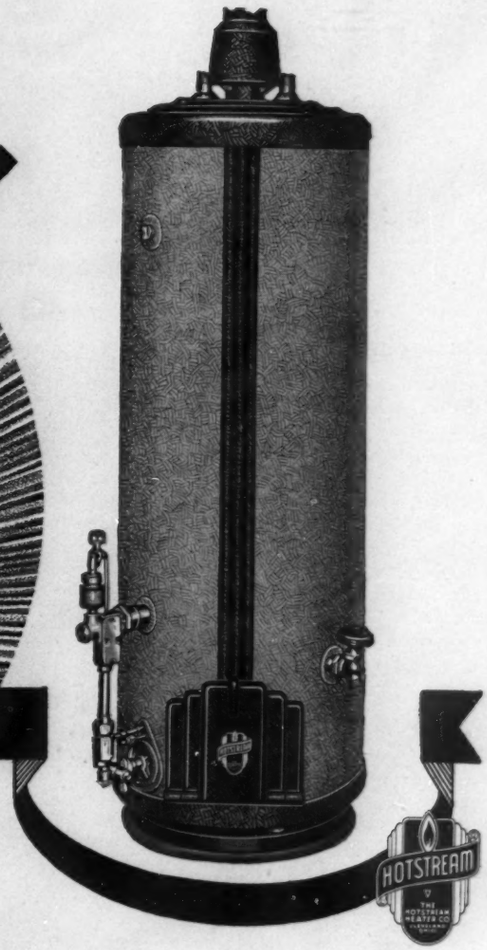
Executive Seeks Connection

An executive, trained in engineering, accounting, commercial and legal management backed by years spent in gas utility work, desires a new connection in the industry. *GAS* will be glad to forward inquiries to the applicant.

HOTSTREAM

You CAN BECOME Cock O' the Walk

WITH THE HOTSTREAM LINE



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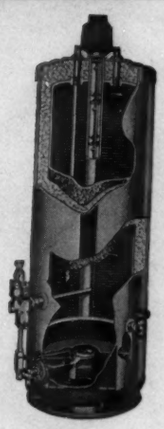
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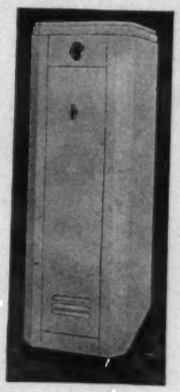
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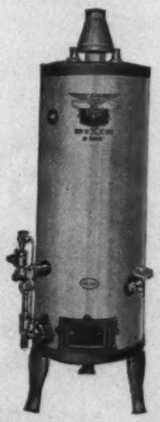
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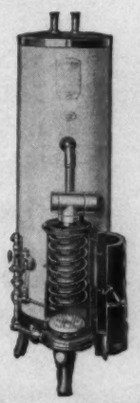
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1. Hotstream Feature
   3 Sizes—20, 30, 40 gallon Quick Recovery
2. Utility Special
   3 Sizes—20, 30, 40 gallon Variable Demand
3. Hotstream Cabinet
   2 Sizes—20, 30 gallon Variable Demand
4. The Dixie
   4 Sizes—15, 20, 30, 40 gallon—Quick Recovery
5. Hotstream Sidearm
   8 Sizes—15 to 100 gallon Quick Recovery

AS a sponsor of the campaign to sell 300,000 Automatics in 1936, "Hotstream" is vitally interested in the success of this program. To this end we have built a complete new line for the Utilities.

From a standpoint of merchandising and load building, the Hotstream line offers you a diversified selection, quality construction, highest operating efficiency and modernistic styles that compel attention.

See that your men get the best to sell. Make it easier for them to become prize winners by building your program around the Hotstream line.

THE HOTSTREAM HEATER COMPANY

OHIO, U. S. A. + + + CLEVELAND

Releasing Survey Data to Dealers

dealers participating, for what other source of business will yield better than one sale out of every five prospects?

Sales, by type of installation, were as follows:

Gas appliances replacing electric appliances	2.2%
Additional gas appliances	14.8%
Gas appliances replacing existing gas appliances	83.0%

As we wished to know what proportion of the appliances sold were additional, or whether they replaced an existing gas or electric appliance, the dealer was asked to include this information in his sales report. Naturally, with the present high saturation of gas appliances in Los Angeles, the proportion of gas replacement sales is high. Although nearly 15 per cent were indicated as additional appliances, a further analysis shows this to be chiefly for space heater and furnace sales.

Figs. 3, 4 and 5 show a breakdown of prospects and sales. Fig. 3 illustrates the proportion of prospects for each appliance to the total. Nearly one-half of all prospects were for ranges, which undoubtedly indicates the greater salability of the range and the effect of promotional advertising.

Fig. 4 gives the sales made for each appliance in proportion to the total.

Fig. 5 shows the percentage of prospects sold out of the number released for each appliance. The information is valuable in guiding our methods of qualifying prospects, and in thus keeping a reasonably profitable return to the dealer.

In the following table is shown the dollar value of sales made for each appliance as compared to the total:

Ranges	$ 7,650.79	36.3%
Water Heaters	3,875.46	18.4%
Refrigerators	6,330.45	30.0%
Space Heaters	729.27	3.5%
Furnaces	2,517.63	11.8%
	$21,103.63	100.0%

Although refrigerators represented only 14.1 per cent of the total number of sales, due to their high unit cost they account for 30.0 per cent of the total dollar volume.

The average dollar value per sale was as follows: Ranges, $115.92; water heaters, $66.82; gas refrigerators, $243.48; space heaters, $31.71; furnaces, $228.88.

These results indicate that, on the average, high quality merchandise was sold. This information is significant to our company, because the surveyor has been educated to talk modern appliances to the consumer and sell the idea of value in quality equipment. Also, our dealer contact men strive to have the dealer sell the better grade of appliance.

Use of Market Statistics

The second set of information resulting from a survey of domestic consumers is market statistics. I believe this type of information can be used to great advantage in co-

(Continued from Page 15)

operation with the executives of manufacturers and dealer organizations. It is of the utmost value to the utility that the manufacturers and the dealers collectively know the potential market available, where this market lies in relation to the size, type and scale of living of the consumer group, and why they are, or are not, as the case may be, getting their proper amount of the business.

As evidence of the effective use of market statistics with dealers, I wish to refer to George H. Finley's article in *Western Gas*, February 1936, describing the Pacific Gas and Electric Co.'s experience on re-entering the gas circulator market. According to the article, this company withdrew from the sale of small circulator heaters in the middle of 1932, but maintained a close study of sales results and amount of dealer advertising. It further states that the facts indicated the gas circulator market was practically forgotten by 1935. Quoting from the article:

"The story was laid before directors of the Gas Appliance Society of California—representing all major dealers—at a meeting held October 2. General Sales Manager Crawford first traced the decline in sales since the company's withdrawal. . . . Dealer Sales Promotion Manager Reynolds next offered an exhibit of dealer advertising on circulators, showing how poorly the volume of such advertising compared with the volume of dealer gas range advertising."

In his summary, Mr. Finley says:

"Another conclusion from this Northern California example is that it pays a utility to have exact information on market trends in its service area. If the company had not had full facts on declining sales and declining advertising volume, it would have been difficult to convince dealers of the need for direct selling, and the company's re-entry into the market might have been achieved at the cost of harmonious relations with its dealers. As it was, endorsement given the company's renewed selling on small sizes of this appliance showed that the facts registered with the dealers. Furthermore, an improvement in sales results for everyone in the market proved the wisdom of the company's action."

Data obtained from our survey of 10,000 consumers, such as an analysis made on gas ranges, giving the type, age, and condition of this appliance on Los Angeles Gas and Electric Corp.'s system by income groups, have indicated to us the possibilities which lie in releasing market statistics to dealers. Intelligent use of market statistics in cooperation with dealers makes it possible to specifically direct load-building efforts to meet known market conditions.

The foregoing has considered the furnishing of survey data to dealers under two heads—prospects for appliances, and market statistics. An endeavor has been made not only to discuss the mechanics of procedure, but also to define and clarify the objective of each activity. By so doing, certain questions have arisen which cannot be completely answered at this stage of our work. The questions of degree of exploitation of prospects by dealers, and how much consumer information to release with such a lead are examples.

Our analysis of sales results from the 10,000 consumer survey does not provide the answers to these two questions. In order to get the feeling of the dealers on this subject, I have talked to a number on the value *to them* of complete consumer information in the development of prospects. In nearly every case the dealer stated that he thought detailed consumer information on prospect leads was a good thing to have. However, the fact that most dealers think it is a good thing is not indicative of the use to which it is put. Most specialty salesmen of various lines endeavor to obtain as much advanced data on their prospect as possible. A successful life insurance salesman, before making a call, will usually find out in advance something of the prospect's family obligations, number of dependents, approximate income and living standards, and, if possible, a few of his habits and hobbies. With such information the life insurance salesman is fortified; he is not only in a better position to make a good approach, but he is better able to know what points to stress and what features of his case will appeal. A cash register salesman does precisely the same thing. Before calling on a merchant, he will endeavor to find out just what system of handling cash is being used at the time by his prospect. Such knowledge is most vital, for the salesman must be able to compare to advantage his system over the one now used, and, in just such a manner to demonstrate the value of his article. It may be argued that selling gas appliances is not specialty selling, and here, again, I wish to point out that this seems to be determined by competition among dealers, the general market as influenced by business conditions and promotional advertising, and the calibre of dealer salesmen.

As competition with other fuels becomes more severe and the cream of ready sales is gone, the merchandising of gas appliances will require an increasing amount of specialty selling. I believe this to be self-evident, but it is corroborated by the experience of utilities in T.V.A. territory, where cold canvassing, house-to-house, is the order of the day. Long before necessity forces such activity as having one salesman to every 350 meters, as in some T.V.A. areas, it will profit us to recognize the principles of specialty selling, for which our furnishing of survey information to dealers, both in the form of prospects and market statistics, is only a beginning.

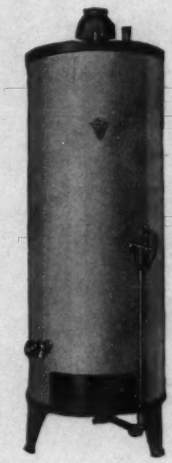
■ ■

Gas-fired Apple Dehydrators

In Sonoma County, Calif., the 1935 apple crop was marketed for over two million dollars. Of the eight thousand tons that were dried, about 75 per cent of the processing was done by gas-fired dehydrators on the lines of the Pacific Gas and Electric Co.

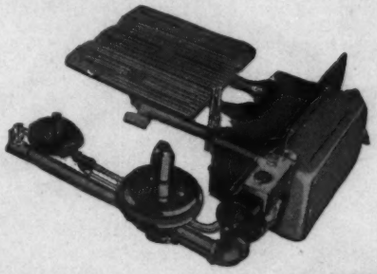
TAKE THE LINE OF
least resistance
the quickest, surest road to sales

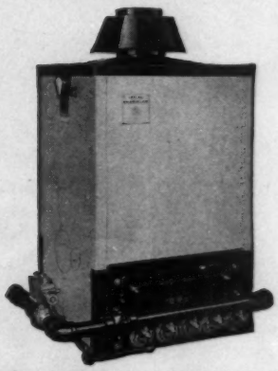
AGP REGULAR—Gas-fired automatic storage water heater. Multiple flue. Heavy gauge galvanized or strengthened copper. 5 sizes: 20 to 75 gal.



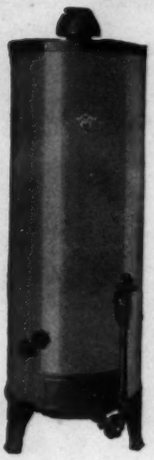
THE DICTATOR—Gas-fired automatic storage water heater. Single flue. Heavy gauge galvanized or strengthened copper. 4 sizes: 15 to 40 gal.

REDFLASH GAS CONVERTOR—Tailor made for Series No. 1 "Ideal" Redflash Boiler, all sizes.





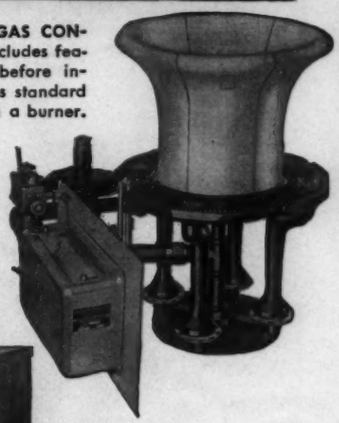
IDEAL GAS-FIRED BOILER—Standard model. Every size for every purpose.

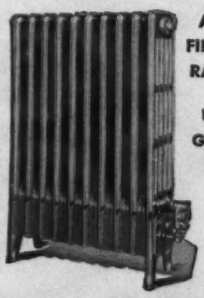


AGP CLIPPER—New, gas-fired automatic storage water heater. Circumferential flue. EXTRA HEAVY TANK, 5 sizes—15 to 40 gal. Made in both galvanized steel and strengthened copper.

IDEAL GAS CONVERTOR—Especially adapted for Arco Round Boiler, but fits any round type boiler or furnace.

AMERICAN GAS CONVERTOR—Includes features never before incorporated as standard equipment in a burner.



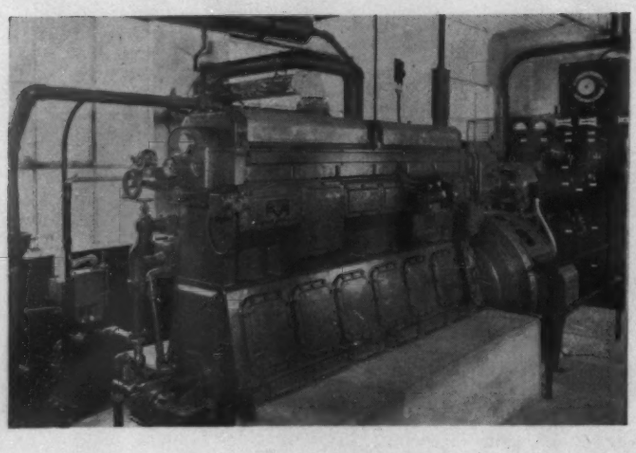


AGP GAS-FIRED STEAM RADIATORS

UNIT-OR GAS-FIRED HEATER

WHENEVER YOU THINK OF HEATING WITH GAS . . . THINK OF AGP

AMERICAN GAS PRODUCTS CORPORATION
DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
40 WEST 40TH STREET · NEW YORK, N.Y.



This Cooper-Bessemer Type EN-6 gas engine at Pittsburgh Plate Glass Co.'s Mt. Vernon, Ohio, plant, starts and operates automatically to drive electric generating equipment in event of purchased-power failure.

Standby Power Unit at Glass Plant

THE Pittsburgh Plate Glass Co., Mt. Vernon, Ohio, on the lines of the Upham Gas Co., has installed a gas engine-driven standby power unit for use in the event of purchased-power failure. Since power interruption of only a few minutes duration in a plate glass plant might prove disastrous to both equipment and product, it is imperative that automatic means be provided for instant switching on of standby power. This installation was, therefore, designed for complete automatic operation, requiring no attendant. To further assure positive continuous delivery of power, a 230-volt, 20 k.w. storage battery is used to temporarily bridge power interruption until the engine starts.

The automatic starting equipment becomes operative the instant the main power goes off. A relay device, operated by a 32-volt battery, turns on the ignition, trips open the gas and water valves, and cranks the engine. The engine kicks off within 2 or 3 seconds. Another 4 or 5 seconds brings it up to full speed. And then, after correct voltage is assured, a second relay hooks it onto the load.

The automatic power unit consists of a 275-h.p., four-cycle, Type EN-6 Cooper-Bessemer gas engine, direct-connected to a 240-volt, 175-k.w. generator and a V-belt-driven exciter. Instant starting is assured by regulation of gas and air, and by operation at constant atmospheric pressure.

In designing the installation, Pittsburgh Plate engineers used standard equipment almost entirely. Of the half-dozen relays, three were built from standard parts and the others were conventional relays.

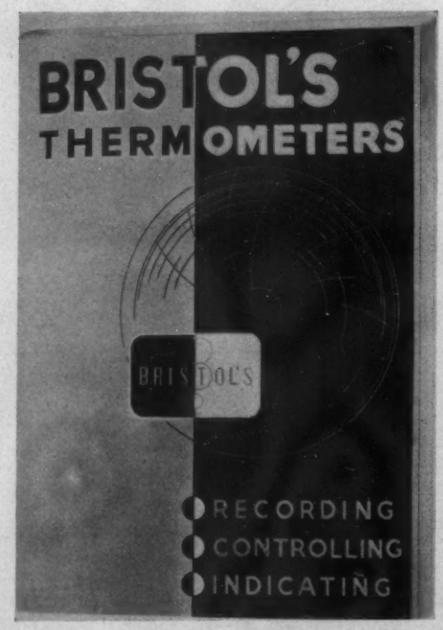
The automatic power unit is tested weekly, going through the full series of operations, even carrying a test load. Purchased power failed once since the installation; and the standby unit had the correct voltage on the switchboard within 15 seconds.

In addition to the automatic starting equipment, several other devices were installed on the engine, including automatic throttle control; thermostatic cutout for excessive cooling-water temperatures; switchboard lights to show that automatic gas and water valves are open; automatic over-speed switch. Another feature is an alarm bell that rings continually from the time of purchased-power failure until the electrician arrives to check over the engine. H. F. Hitner and H. W. Gardner are the Pittsburgh Plate Glass Co. electrical engineers responsible for the installation.

■ ■

New Catalogue on Bristol Thermometers

The Bristol Co., Waterbury, Conn., announces the publication of a new, 88-page thermometer catalogue, containing information concerning the theory and practice of modern thermometry. This catalogue, No. 1250, covers liquid-filled, vapor-tension, and gas-filled recording, indicating, and controlling thermometers. It also describes a new small-bulb gas-filled thermometer. In connection with automatic temperature controllers, it gives information regarding both the electric and pneumatic types, and sketches illustrating their application. As an addition to this, application data are given on industrial stem thermometers, resistance thermometers, humidity measuring instruments, control valves, time-temperature controllers and the accessories that are used with thermometers on industrial applications. In order to enhance the value of the catalogue as an engineering handbook, over 500 temperature recording charts are reproduced in full size.



Cover of new Bristol Catalogue.

■ ■

H. W. Walters Joins Allis-Chalmers

H. W. WALTERS

ALLIS - Chalmers Mfg. Co., Milwaukee, Wis., through its district manager, A. D. Brown, announces the appointment of H. W. Walters to its Los Angeles sales staff, effective May 1.

Mr. Walters, upon graduating from Purdue University, joined the sales organization of Ingersoll Rand Co., and served in its various engineering and sales divisions, including seven years with the Los Angeles factory branch. In 1933 Mr. Walters acted as design engineer of the Hoover Dam concrete cooling system at Boulder City, Nev. For the past year he has been power engineer with the Southern California Gas Co.

As a member of the Los Angeles district office of Allis-Chalmers Mfg. Co., with headquarters in the Rowan Building, Mr. Walters will contact the oil and gas trade.

■ ■

Novel Contest Stunt Used by Iowa Company

IN a recent issue of the "Roper Ranger," a publication of the Geo. D. Roper Corp., appeared a report of a novel contest stunt which was used by the United Light & Power Co., Davenport, Iowa, during a gas heating campaign.

The stunt consists of placing the 52 cards of a deck in 52 envolopes, and whenever a salesman makes a sale, he selects one of the envelopes. Under his name on a contest board he pins the card he has drawn. At the end of a designated period the salesman who can make the best poker hand from the cards pinned under his name, wins the pot at stake.

Since it takes five cards to make up a poker hand, salesmen with less than five sales for the period are automatically eliminated, and the salesmen having the greater number of sales have a decided advantage, as they are allowed to select the five best cards under their respective names.

If it is apparent from the first few cards drawn by any one salesman that he will hold a winning hand, the balance of his cards are pinned face down. If, for example, one man draws two aces for his first two cards, his subsequent drawings are turned face down as a third ace might settle the issue before the end of the designated period.

From Tanks of
NON-RUST EVERDUR METAL

THE PUBLIC GETS: Clean, rust-free hot water indefinitely . . . Complete freedom from rust expense . . . Longer service and better value

THE UTILITY GETS: Steadier gas consumption . . . Freedom from constant servicing . . . More satisfied customers

EVERDUR METAL *cannot* rust. And this explains why tanks of this strong copper-silicon alloy are more satisfactory not only to the public . . . but to the utility as well.

For the buyer . . . an Everdur tank provides the assurance of clean, *rust-free* hot water indefinitely. It marks the end of all tank repair and replacement costs due to rust.

From the standpoint of the utility . . . Everdur tanks are profit-makers. Rust and rust-repairs never interfere with the steady consumption of gas. Everdur tanks require far less servicing. They may be sold with complete assurance that their reliable performance will satisfy customers. They can be guaranteed against tank failure through corrosion. They provide a sound basis for longer-term payment plans.

Because it is absolutely immune to rust, durable, easily welded and strong-as-steel . . . no less than 24 leading manufacturers of automatic gas storage water heaters now standardize on Everdur Tanks for rust-proof models. 36123

ANACONDA

EVERDUR METAL

"Everdur" is a registered trade-mark, identifying products of The American Brass Company made from alloys of copper, silicon and other elements.

THE AMERICAN BRASS CO.
General Offices: Waterbury, Conn.
Offices and Agencies in Principal Cities
In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ont.

EVERDUR METAL FOR TANKS

RUSTLESS AS COPPER . . . STRONG AS STEEL

Interior of main building at Texoma's Station No. 1, showing battery of Worthington units, of 19,500 H.P. combined capacity

Texoma's Compressor Station No. 1

(Continued from Page 17)

to which the condensate is returned automatically.

Housing facilities are provided on the premises for the operating personnel, since accommodations in adjacent communities are practically non-existent. These dwellings are exceptionally well built and are up-to-date in all respects, every modern convenience having been provided for the comfort of the operators and their families. There are 32 such homes, including five-room and four-room houses, dormitories for single men, boarding houses and three-room duplexes. Four 14-car garages are centrally situated in this miniature townsite and excellent driveways with concrete curbs and oiled surfaces are provided, along with concrete sidewalks and street lighting system.

The entire property has been landscaped with a variety of trees and shrubs which has done much to beautify the surroundings. Bermuda and blue grass lawns are being created with some difficulty owing to many adverse conditions existing in this relatively arid country, but persistent efforts will no doubt bring eventual success.

Gasoline Extraction

The gasoline extraction plant is of the high pressure absorption type, where a variety of vapor pressure natural gasolines are manufactured to suit marketing requirements. Provision has been made for emergency storage of approximately 1,000,000 gallons by the installation of forty 11- by 40-foot horizontal tanks arranged in four batteries of 10 each. A 16-car loading rack served by two spur tracks permits the loading of eight cars on either side for each switching movement. A very complete chemical laboratory, where scores of tests are made daily, controls the operation of the gasoline plant and performs the very important duty of controlling the quality of the gas delivered to the station from the producing wells. Such tests are made for protection against hydrogen sulphide, and an offending well can be identified and adjusted very quickly.

The gas, as it is received from the compressor station, is passed through nine 48-inch by 41-foot absorbers, where it is stripped of its gasoline constituents. Beyond the absorbers, it is processed in the dehydrating apparatus. Here the gas temperature is reduced to about 40°F., using propane as the refrigerant, and a large percentage of the water vapor normally carried by it is removed. Calcium chloride brine, which is continuously circulated to help in reducing the water content of the gas, is kept at the desired concentration by boiling off accumulated water. Thus, by eliminating the water vapors which would otherwise condense in the pipeline system when ground temperatures approach 35°F., freeze-ups due to the formation of hydrates, internal line corrosion, regulator and meter troubles are practically eliminated.

■ ■

Building Mythical Cities as Sales Aid

Building mythical cities is gaining considerable popularity in gas sales departments. Portland (Ore.) Gas & Coke Co. has built "McKeeville" (covered in detail elsewhere in this issue) and Washington Gas and Electric Co. will complete building "New Roachville" on May 29. "New Roachville" has $965,000 worth of property for sale, portioned out to the company's several districts. Appliance sales serve in lieu of property sales, and employees are credited in accordance with a point system. At the close of the drive on May 29 the employee having the most points will be elected "Mayor of New Roachville." "McKeeville" is named in honor of Paul B. McKee, president of Portland Gas & Coke Co., and "New Roachville" in honor of T. E. Roach, vice-president and general manager of Washington Gas and Electric Co.

San Joaquin Company Rate Reduction Announced

San Joaquin Light and Power Corp. Fresno, Calif., has announced a reduction in gas rates effective May 1, which will amount to $96,000 annually. This is the third reduction made by the company in the past three years, bringing the grand total of savings to gas users since 1933, to $195,000 annually.

Under the new reduction domestic consumers will realize savings of more than $76,000 per year and industrial consumers about $20,000.

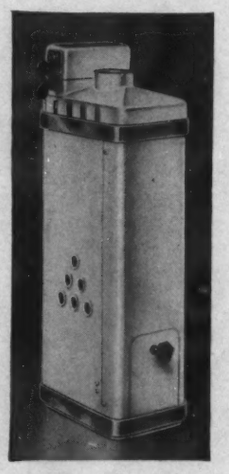
A major part of the savings will accrue to Fresno and vicinity with comparable savings to consumers in the Selma, Merced, Fowler, Madera, Chowchilla, and eastern areas.

Bakersfield rates are lowered by a reduction of the minimum charge from 85c to 70c per month. Bakersfield already enjoys lower gas rates than those charged in nearly all other sections of California. Natural gas service was established there in 1910 whereas it was not introduced in the other cities of the San Joaquin system until 1929.

■ ■

Welsbach Announces New Conversion Heater

Welsbach Co., Gloucester City, N. J., announces the development of the Welsbach Hotzone "Number Seven" conversion gas water heater. The purpose of this heater is to make it possible to change present tanks into automatic storage gas water heaters.



This heater utilizes a Welsbach luminous flame burner with a safety gas shut-off, and has an input of 5,000 B.t.u.'s per hour. This heater is also equipped with a Welsbach thermostat which controls the water tank temperature.

It is finished in white baked enamel with bands and fittings of satin metal finish. Its dimensions are 4¾ by 7¼ by 18½ inches.

■ ■

Suggestion Earns Award from Western United

The suggestion that prints of detailed drawings of all governor pits and valve pits be placed in moisture-proof containers and installed in their respective locations recently earned a $25 award for A. A. Wittry of the gas engineering department of Western United Gas Co., Aurora, Ill., in the company's suggestion-award plan.

Placing the drawings in the container protects them from becoming soiled and torn. Also, locating them in a known spot assures that they will be available when needed.

MAGIC CHEF

...has everything Mrs. Modern wants

MAGIC CHEF
GAS RANGE
SERIES 2500

● Magic Chef is the gas range Mrs. Modern is buying today because it typifies and embodies everything she admires and wants in a modern range. It embodies her ideas of present day style and beauty, measures up to her standards of convenience and efficiency, fully meets her requirements of service and economy.

Magic Chef sets a safe course for Mrs. Modern in buying a gas range because of its unquestioned leadership in design, advanced features, genuine quality and dependable performance. It sets a true course in gas range selling for gas companies and retailers because it keeps abreast of changing conditions in the cooking appliance field, grades up and sustains the market in quality gas ranges, builds up and holds consumer confidence necessary to successfully meet competition.

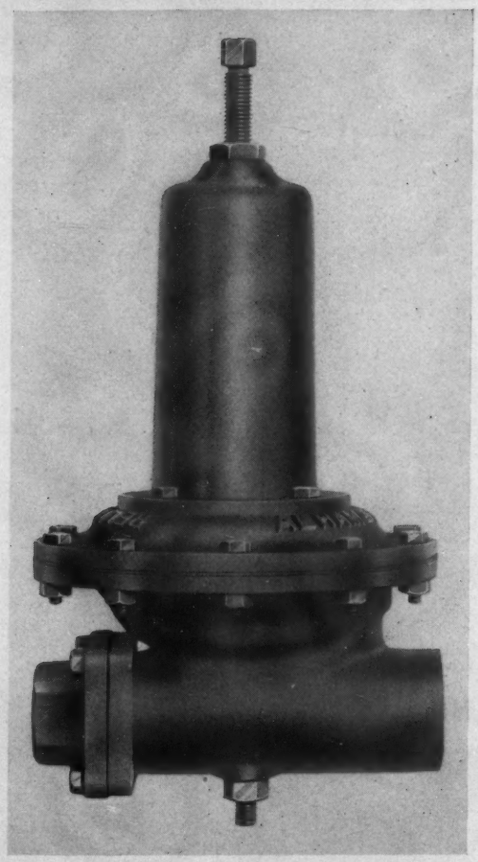
With all these advantages Magic Chef also has the *plus* of National Advertising to strengthen the position of the gas company and make its selling job easier.

LOOK FOR THE RED WHEEL WHEN YOU BUY A MAGIC CHEF

AMERICAN STOVE COMPANY
BOSTON • NEW YORK • ATLANTA • CLEVELAND • CHICAGO
ST. LOUIS • PHILADELPHIA • SAN FRANCISCO • LOS ANGELES

Magic Chef
AMERICAN STOVE COMPANY

RELIANCE REGULATORS

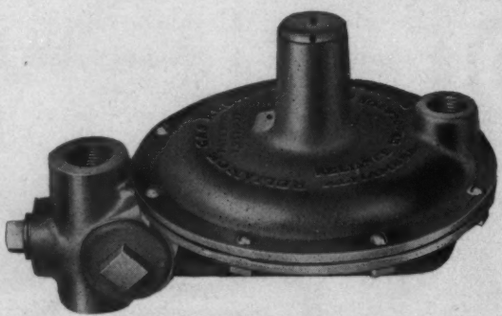


Above. Reliance High Pressure Compounding Regulator. Fully Patented.

. . . Maintain Uniform Pressures

Reliance Regulators maintain uniform delivery pressures at extremely high rates of flow and have an exceedingly low lock up. Type H and Type K Regulators are made in spring loaded or dead weight types, with or without a mercury seal. Valve and valve seats are easily accessible for inspection and replacement through the hand hole, and adjustments for changing pressure are readily made. The High Pressure Compounding Type Regulators in ¾", 1" and 2" sizes, are for reducing extremely high inlet pressures to intermediate pressures of between 5 and 40 lbs. They are extremely compact with high capacities and have a positive lock up.

The Reliance Organization also manufactures a complete line of industrial, domestic and district regulators. These include Type A, weight loaded appliance regulators either with or without safety factor, and Type Y, spring loaded appliance regulators.



Above. Type H or K Spring Loaded Regulator. Manufactured also in dead weight type. Patent No. 1,931,777.

RELIANCE REGULATOR CORPORATION

1000 Meridian Ave. Alhambra, California

REGULATORS FOR MANUFACTURED, NATURAL AND BUTANE AIR GASES

The Effects of Humidity on Meter Proof

By C. W. CAPWELL

San Diego Consolidated Gas and Electric Company*

MANY tests have been made, all showing that dry gas will cause a speed-up of leather diaphragm meters and that gas having a higher relative humidity will actually cause meters to slow down. Thus we know the causes of the meter inaccuracies which we desire to avoid, but in practice it is extremely difficult to control the relative humidity because to keep it constant a constant temperature and pressure relation must exist. As the temperature of the gas drops the relative humidity rises until the gas becomes saturated, and any further lowering of the temperature will cause the excess water to drop out of the gas.

Also in a system using high pressure distribution with several steps in the process of reducing this pressure, and also the expansion of the gas as it travels from its source, the relative humidity will drop with the absolute pressure.

In the case of a meter operating on a gas whose dew point is 70° F., at noon the temperature of the meter may be anywhere from 80° F. to 90° F. At this time the gas has a relative humidity of from 72 per cent to 52 per cent. As the afternoon progresses the temperature of the meter drops until it passes 70° F., or the dew point of the gas, and free water is liberated, soaking the leather diaphragms. The meter remains in this condition until the following morning when the temperature is again raised until it is above the dew point of the gas. This alternate soaking and drying of the diaphragms will cause them to stiffen which results in a permanent speed-up of meter proof.

If the dew point of the gas is kept below the minimum temperature of the meter, no water will be liberated; hence no soaking of the diaphragms will occur and the meter will not be affected.

The question may arise that with low humidity gas the oil in the diaphragm will soon be absorbed, but this can be offset by using mineral oil of a low vapor tension and a high boiling point.

In distributing natural gas in San Diego it is necessary in equalizing the load to store the gas for the low pressure distribution system in a holder of the water-seal type. The gas in this holder was in contact with the water seal, until in the latter part of 1934 it was noticed that a greater number of fast meters were coming in from the low pressure district than from the high pressure district. Also a great number of meters were wet when brought in from this district.

A dew point survey was made and it revealed that the gas in the area fed from the holder was saturated, or nearly so. It was decided to apply an oil seal over the water in the holder. This resulted in a rapid drop of the dew point of the gas at the outlet of the holder and by September 1935 the dew point over the entire low pressure district had dropped to about 28° F.

To study the effect of the various humidities on meters the distribution system was divided into zones, in 1934, and since that time a record of the location of all fast meters has been kept.

Seven of these zones have consistently shown a higher percentage of fast meters than the others. Nearly all of the area in these seven zones is fed from the low pressure holder and formerly had a relative humidity of 100 per cent, or nearly so. This is borne out also in Oceanside and Escondido, Oceanside being dry and having a high accuracy, while Escondido is wet and the meter accuracy is down.

Fig. 1 shows an experimental set in which 12 meters were placed for a period of one month.

Dry gas was taken at 80 lbs. per square inch gauge pressure and passed through a series of regulators and humidifiers, and then through meters so that four meters were operating on dry gas (18° dew point), four were on gas of about 80 per cent relative humidity, and four were on gas having a relative humidity of approximately 40 per cent.

The 12 meters were enclosed in an insulated box equipped with two heating elements and connected by a pipe to a cooling device. This cooling device was an ice compartment fitted with a motor-driven blower.

The heating elements and the motor on the blower were connected to a timing mechanism so arranged that the heat was on for 2 hours and the cooling device operated for 4 hours, thus making a cycle of 6 hours or four complete cycles each 24 hours.

Connected with the heating elements was a thermostat so set that the temperature would not rise above 95° F. The cooling device reduced the temperature to about 50° F. at night and 60° F. in the heat of the day. Thus the temperature during the hours of low temperature was below the dew point of either of the highly humidified gases and yet above the dew point of the low humidity gas. During hours of high temperature it was above the dew point of all the gases.

This setup was devised in order to duplicate the action on a meter exposed to daily temperature changes, but instead of the cycle being 24 hours it was reduced to 6 hours.

These meters were tested before being set and again after a month of operation, with the following results:

Meters on wet gas (80 per cent R. H.), average 2.5 per cent speed-up;

Meters on gas of 40 per cent R. H., average 3.1 per cent speed-up;

Meters on dry gas (18 per cent R. H.), average 1 per cent speed-up.

The above results show once again that if the dew point of the gas is kept below the minimum temperature of the meter, better results will be obtained than when the dew point is above the minimum temperature and condensation occurs.

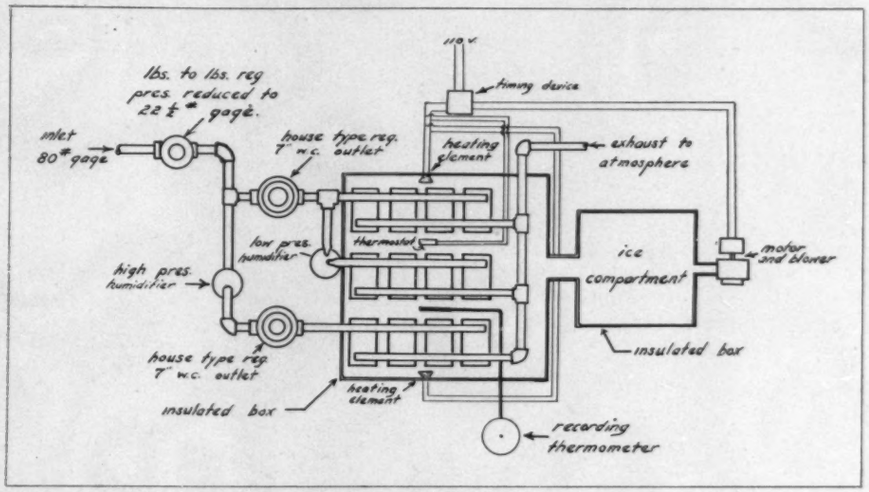


FIG. 1.

*Portions of a paper presented before the Pacific Coast Gas Association Technical Section Spring Conference, Los Angeles, Calif., March 26-27, 1936.

S.C.M.A. and C.N.G.A. Hold Golf Match and Joint Meeting

ON April 9 Southern California Meter Association and California Natural Gasoline Association held an inter-association golf tournament at the Long Beach Municipal Golf Course, first event of the kind ever staged by the two organizations. The outcome was a total gross score of 1225 to 1224 for the two 14-man teams, the meter-men winning by the slender margin of one stroke. George Christen of the Crosby Steam Gage & Valve Co., S.C.M.A. entertainment chairman, and Gordon Greene of the Robinson Orifice Fitting Co., C.N.G.A. entertainment chairman, were responsible for handling details of the match.

The golf tournament was followed by a joint dinner meeting at the Long Beach Municipal Club House during which John Rogers of Ingersoll-Rand Co. presented a paper on "Problems in Connection with Compression of Natural Gas." Following the paper, discussions on the subject were led by A. K. Hegeman of Smith Booth Usher Co. and by James Reed of Cooper-Bessemer Corp.

■ ■

C.N.G.A. Spring High Jinks

The California Natural Gasoline Association will hold its Annual Spring High Jinks at the Lakewood Country Club, North Long Beach, on June 6. The day will be devoted to golf, tennis, badminton, ping pong, baseball, archery and horse shoe pitching matches, followed by a banquet and entertainment in the evening with $100 in door prizes to be given away.

Gordon Greene of the Robinson Orifice Fitting Co. is chairman of the entertainment committee.

■ ■

Peoples Distributes Pamphlet of Useful Facts for Customers

Peoples Gas Light & Coke Co. is distributing through its main and neighborhood offices a pamphlet which has been issued under the title, "Useful Facts for Gas Customers."

Information covered in the pamphlet falls under the following sub-heads: How to Get Gas Service; Information Needed to Give Service Promptly; The "Moving Rush"; Opening an Account; Our Office Hours; Reading Your Meter; Accuracy of Gas Meters; Our Employees; Rates and Basis of Billing; Paying Your Gas Bill; If Your Payment is Delayed; How to Avoid Wasting Gas; Water Heaters and Flue Pipes; Housekeeping and Homemaking; Talks Over the Radio.

■ ■

S.C.M.A. Third Industrial Trip

The third industrial trip of the Southern California Meter Association, which took place on the afternoon of April 23, had an attendance of about 35 consisting of members and their friends. The plant visited on the trip was that of the Firestone Tire & Rubber Co. at 2525 Firestone Blvd., Los Angeles.

GF

CUT-OUT LATCH REGULATOR

It Stops the Flow of Gas if Pressure falls too low

ON a low-pressure burner or furnace, the Fulton Cut-Out Latch Regulator stops the flow of gas if pressure falls below the desired minimum. Whenever that happens, the cut-out latch will operate automatically to bring the valve to its seat and lock it there. Flow will not resume until the operator goes to the valve and opens it by hand. This eliminates completely the hazard for which the regulator is designed. Catalog on request.

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MODERN METHODS AND MATERIALS

A letter to GAS will bring you any of the selected reference bulletins listed below, without cost. Indicate by number which you desire.

NO. 119—AUTOMATIC CONTROLS

Artistically produced 48-page bulletin in color covering complete line of automatic controls for all types and sizes of air conditioning equipment. Contains photographs of the individual control units, describing their purpose and operation in running copy.

NO. 120—BRONZE WELDING

Ten-page pamphlet presenting the theory and technique of bronze welding and surfacing. Treats of pre-heating and of special considerations with reference to various metals and alloys.

NO. 121—GAUGE COCK

Folder on self-grinding, rotating type gauge cock. Details instructions for ordering for different purposes.

NO. 122—CONTROL INSTRUMENTS

Multiple folded leaflet on air-operated control instruments for regulating temperature, pressure, flow and liquid level.

NO. 123—SPRAY GUNS

Thirty-two page bulletin in color dealing with a line of spray guns for finishing, cleaning and oiling, and auxiliary equipment.

NO. 124—SHEET IRON

Illustrated 64-page booklet describing manufacture of sheet iron from ore pit to finished product. Contains gauge tables and glossary of metallurgical terms.

NO. 125—PORTABLE COMPRESSORS

Bulletin on four models of gasoline engine driven, portable compressors. Capacities, bores, strokes, number of cylinders, etc., are given for each model.

NO. 126—TOOLS

Extensive line of various types of wrenches, pliers, hammers, screw drivers, punches and chisels listed in a 48-page illustrated catalogue. Contains numerical price list. Punched to fit standard loose-leaf binders.

NO. 127—IMMERSION PYROMETER

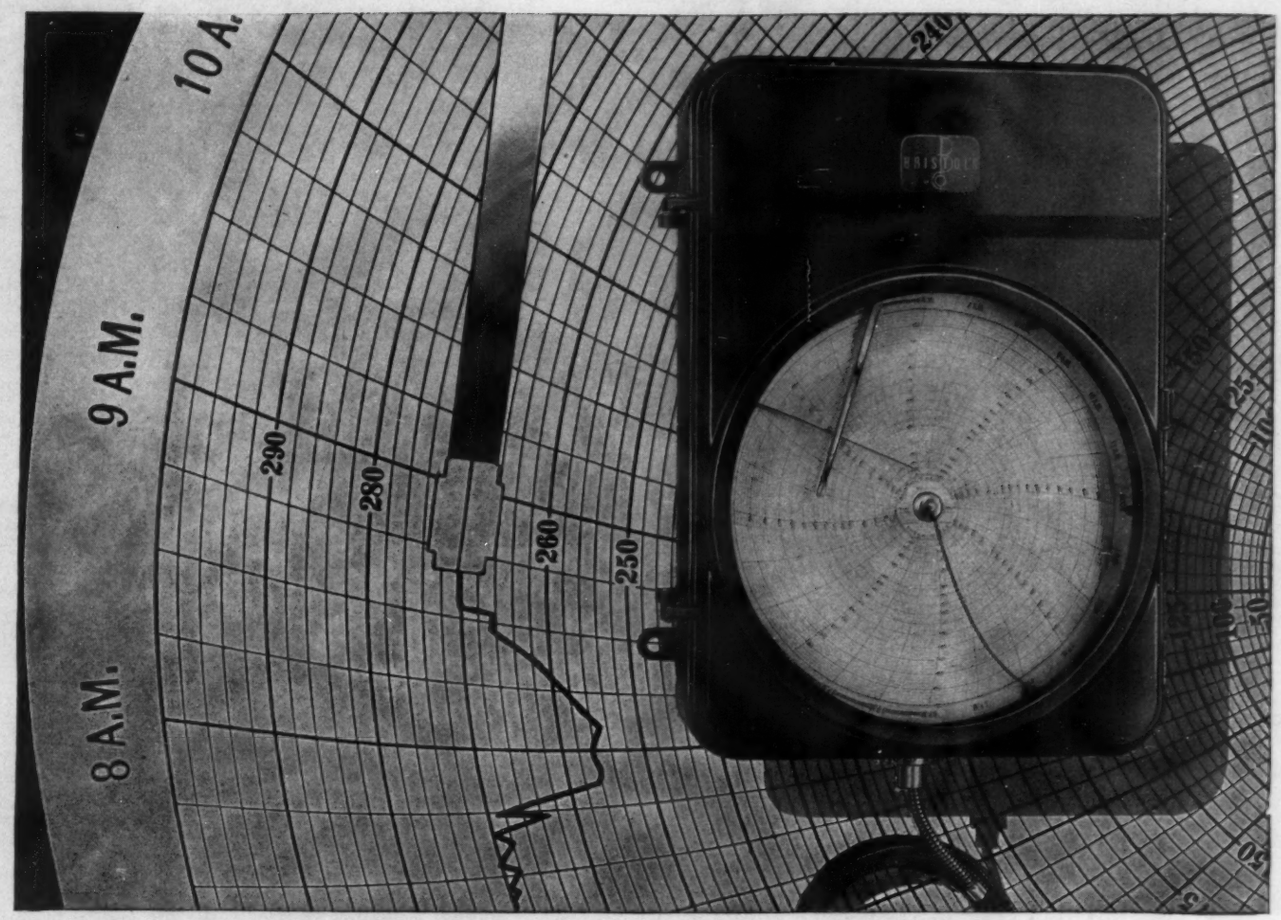
Folder on a self-contained immersion pyrometer with instructions for use and table of specifications.

NO. 128—INDUSTRIAL PUMPS

Line of industrial compressors and vacuum pumps dealt with in a 32-page illustrated catalogue. Contains tables for sizing and detailed descriptions of various units.

NO. 129—SPECIAL DEVICES

Four-page folder illustrating and describing unit heater hanger, automatic gas cock switch, safety cock, external lighter for furnaces, furnace door closer, etc.



DISCOVERED—*in time!*

WITH THIS Bristol's Recording Thermometer continually watching your processing, fluctuations in temperature *are* always discovered, —in time.

Every variation, even the smallest, is instantly recorded. Is the temperature jumping too high? Too low? Has something gone wrong? The ever-alert Bristol's chart record immediately forewarns you.

Here is an aid to more efficient manufacturing that pays its own way in the information it provides. Accurate within the closest industrial tolerances—of simplified construction free from costly upkeep—sturdily built for assuring good performance.

Write for Bulletin No. 443N. You'll find it interesting and helpful.

AUTOMATIC CONTROL IS MODERN TREND

Many plants today are using instrument control for automatically regulating such process variables as temperature which they formerly were content just to measure. The resulting economies in the way of better product quality are often surprising. Our engineers will welcome the opportunity to discuss the matter with you.

A COMPLETE LINE

Bristol's Thermometers are fully described in our new comprehensive 88 page Thermometer Catalog and Handbook, now on the press. In writing, ask for Catalog No. 1250N.

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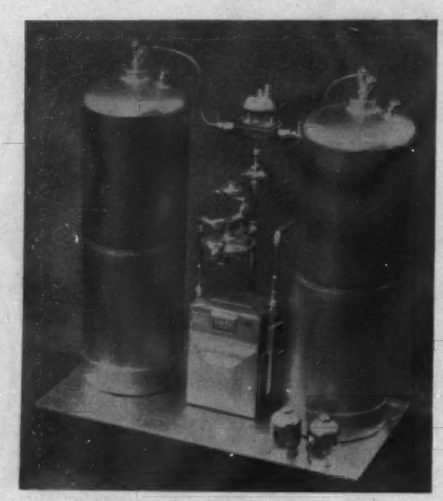
BUTANE-PROPANE NEWS



Southern Counties Gas Co.'s standard bottled gas installation for customer of average consumption. The two 100-pound cylinders are set upon a steel base plate.

"Future Customers for Piped Gas Are Protected by this Service Plan"

INTRODUCTION of bottled gas service for customers located close to its existing natural gas lines has been inaugurated by Southern Counties Gas Co., Los Angeles, Calif., and marks that utility's two-fold use of liquefied petroleum gases to supplement its regular service. Southern Counties some years ago pioneered the undiluted vapor type of central plant, installing the first of this design at Moorpark and later making another central plant installation at Los Flores Canyon.

Bottled gas service was begun several months ago with a carefully outlined policy governing its use. The service is available to residential and business customers who are located within the boundaries of the territory served by the company within one mile of existing natural gas mains, and who are either on or within one mile of a regular meter reading route. Some exception may be made to the above in the case of large users, or groups of users located more distantly from existing mains.

No service will be extended to customers already under contract with another seller of bottled gas, without the consent of the distributor holding the contract.

The standard plan of service provides for at least two 100-pound tanks at each location, gas being sold through a meter equipped with a special bottled gas index registering consumption to the nearest 10 cubic feet. Meters are read and customers billed monthly.

Two-tank installations are used where the connected load is not above 100,000 B.t.u. per hour (equivalent to 91 cubic feet of natural gas per hour) and where the estimated maximum monthly consumption does not exceed 150 pounds per month. Larger usage calls for manifolded tanks in required number.

The bottled gas supplied consists of 95.3 per cent propane, 2.63 per cent isobutane, 1.32 per cent normal butane, and .73 per cent ethane.

For bottled gas service the company has the following rate schedule in effect:

First 25 lb. or less per month....$2.50
Next 75 lb. ..... .04 per lb.
Over 100 lb. ..... .03 per lb.

No installation charge is made, and there is no lease or rental charge for the use of the service outfit.

All house piping for bottled gas service must be made in a workmanlike manner and must pass a 10-pound pressure test before service is begun. Among other house piping specifications it is provided that sizes shall be such that the maximum pressure drop between the meter and the most remote appliance shall not exceed 0.2 inches water pressure, assuming use of natural gas.

Service is refused if customer's appliances fail to meet adequate standards of safety and efficiency. No appliance which the company regards as unsafe for operation on natural gas, such as unvented water heaters, will be served with bottled gas. Appliances having permanent pilots must be equipped with shut-off devices to close off gas supply both to pilot and main burner within 10 minutes after pilot flame is extinguished. (This does not apply to top burner lighters on ranges, nor to oven pilots which are lighted only when oven is in actual use, providing such pilots operate properly on bottled gas.)

Fixed orifice adjustments are used for all appliances.

In connection with safety requirements, provision is made for an annual survey of bottled gas appliances being served. If any "outlawed" or unsafe appliances are found, the customer will be notified that service will be discontinued after 30 days, providing the condition is not corrected.

In extending bottled gas service the company makes an effort to induce customers to purchase appliances approved by the A. G. A. Testing Laboratories for operation on propane.

Inactive bottled gas sets are removed at once from the customers' premises unless it is known that service will be resumed within three months. Usual "turn-on" and "turn-off" practices as followed in natural gas service, apply to bottled gas operations.

The standard practice order developed to govern Southern Counties' bottled gas activities makes full safety provisions, indicating where sets may not be installed, and setting forth important safety rules applying to leakage of bottled gas in enclosed spaces.

In setting up its plan the company has followed the pattern of normal natural gas service as closely as possible, anticipating placement of the bottled gas customers on natural gas service as soon as main extensions can be made economically. Credit policies are virtually the same as for natural gas service, and the customer pays for his gas following its use, instead of in advance.

As the plan has been in use only a few months, something over 100 customers are now being served with bottled gas. It does, however, represent a carefully thought out method of using bottled gas to suppplement and extend utility company operations, laying the ground for future main extensions and protecting logical future gas customers from competitive fuels.

Butane Service for Palomar Mountain Site of 200-Inch Telescope

A BUTANE-PROPANE mixture will be used for cooking, water heating and space heating in the buildings being constructed on the summit of Palomar Mountain in the northern part of San Diego County, Calif., which will be the final resting place of the 200-inch, world's largest telescope reflector. The reflector was recently shipped by special train from the East to the California Institute of Technology at Pasadena for grinding. Although three years will be required for grinding, construction work on the Palomar observatory site is already under way.

To care for the work camp cooking and water heating, and space heating in the supervisor's cottages, a butane storage and a complete undiluted gas plant is now being installed by Parkhill-Wade, Inc., with A. E. DeBurn supervising the project. Gas service will be extended to the observatory, lecture hall, dormitory and other buildings as they are completed. Present service will include the construction camp and four other houses. Stoves, water heaters and space heaters are being installed to supply the needs of about 40 men that are now in the construction camp.

The main butane storage tank of 4,000-gallon capacity is above ground and will be supplied by tank truck delivery. A vaporizer has been installed that utilizes hot water for the heat exchanger, and is balanced to cut in automatically the vapors from the top of the tank should the liquid phase become inoperative for any reason. Gas distribution will be at 20 pounds per sq. in. because of the considerable distances between points of utilization. Each building or camp will be metered individually and the pressure reduced to the conventional 10 inches of water column for consumption in the appliances. One isolated dwelling will be served by bottles filled from the main storage.

It is anticipated that the standby motor generator sets may be operated from the same butane system. Since the time for best astronomical observation is that immediately following a storm when power lines are likely to be damaged, it is imperative that the standby electrical equipment be such that it can pick up the electrical load instantly for rotating the huge telescope.

The present gas load at the camp is about 1,000 gallons per month and estimated future load is 4,000 per month. The fuel supply is a commercial butane mixture containing approximately 30 per cent propane, to prevent condensation in the lines from the cold, mile high atmosphere and the high distribution pressure.

■ ■

Peoples Gas Company-Wide April Prospect Drive

A company-wide prospect campaign of the Peoples Gas Light and Coke Co., Chicago, got under way April 1 to run for 30 days. In keeping with the season the drive has been named the "Play Ball Campaign" and is participated in by all departments and employees of the company. The campaign is aimed at the sale of gas ranges, water heaters and refrigerators with commissions and cash awards being credited to employee prospects that result in sales.

As sales aids for the effort, employees are provided with complete information on the three appliances through a special four-page supplement included in the April 1 issue of the company house organ. In addition, they are furnished with a 12-page illustrated catalogue on late models of appliances. They have also been provided with a book on water heating prepared by the advertising department and with an Electrolux pamplet.

■ ■

R. F. C. Revealed as Holder Middle West Stock

The Reconstruction Finance Corporation has been revealed as the owner of 165,000 shares of stock in the new Middle West Service Co., which amounts to approximately five per cent ownership of the company formerly known as the Middle West Utilities Co.

The fact of the stock ownership became known when representatives of R. F. C. gained an extension from Federal Judge James H. Wilkerson for filing objections to certain reorganization fees which are held to be exorbitant. R.F.C. secured the stock through the liquidation of banks and institutions holding stock in the former Middle West company.

PROTECTION THAT STARTS AT THE TOP

On this Hackney cylinder for Propane, Butane, and Butane-Propane mixtures, a welded collar protects the valve at the top. Handling . . . stacking . . . rolling—in spite of hard service . . . safety from damage is assured.

In every part, Hackney cylinders provide protection. They are high in strength, yet low in weight. That means safety protection. It means protection of handling ease and economy.

Hackney skill in manufacturing comes from more than 34 years' experience producing metal containers for countless leading industries. In the liquefied petroleum gas field, Hackney is the leader by a wide margin.

Hackney MILWAUKEE

PRESSED STEEL TANK COMPANY

1185-208 S. La Salle St., Chicago, Ill.: 6633 Greenfield Ave., Milwaukee, Wis.
666 Roosevelt Bldg., Los Angeles; 1363 Vanderbilt Concourse Bldg., New York

Containers for Gases, Liquids and Solids

Glycerine Dehydration Plant Built by So. Counties

Southern Counties Gas Co., Los Angeles, last month completed construction of a glycerine absorption type dehydration plant at Huntington Beach, Calif., first of this type to be installed in high pressure gas transmission service. The new plant was built at a total cost of $9,000 and has a capacity of 24 million cu. ft. per day at a pressure of 250 pounds per sq. in. to a maximum of 400 pounds per sq. in. gauge. It is designed to depress the dew point of gas leaving it not less than 20° F. below the corresponding inlet temperature.

The plant is located on the property of the Industrial Fuel Supply Co. on the discharge of the compressor station which delivers gas to the Southern Counties Gas Co. line running south to San Diego. The San Diego line is carrying about 18 million cu. ft. daily.

■ ■

Imperal Building Filling Plant at Sacramento

The Imperial Gas Co., headquartering in Los Angeles, is building a filling plant in Sacramento, Calif., for its local distributor, Warren E. Lehe. The new plant will have a daily capacity of 100 tanks.

The Sacramento plant will be the second one of its type that Imperial has built in addition to its main filling plant at Huntington Beach.

KEROTEST
tested and proved
FORGED BRASS
CYLINDER VALVES
and S. A. E.
FLARE FITTINGS
for
PROPANE
BOTTLED GAS
SERVICE

Write for descriptive circular
KEROTEST MFG. CO.
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KEROTEST

Portable Indicating Pyrometer for Appliance Testing

THE Appliance Research Laboratory of the Los Angeles Gas and Electric Corp. has developed a portable indicating pyrometer which can be used with thin-wire flexible thermocouples, such as iron-constantan encased in asbestos tubing. These thermocouples may be inserted through gas range oven vents, or the oven door closed against them. The instrument makes possible very rapid and accurate calibration of gas range ovens, and temperature measurements in general.

No apparatus of this nature was found available on the market, but it was found possible to construct the instrument desired, using a Weston 0-500 range microammeter with 8-ohm armature, various small switches and other accessories, and a 4 x 6-inch filing cabinet (such as is used by housewives for filing recipes). The iron-constantan thermocouples are cut to a length of approximately 5 feet, such that the scale of the instrument (0-500) can be read directly in degrees F. By inserting a switch-controlled resistance the range can be doubled, to read 0-1000 degrees F. The accuracy of the instrument is 0.5 per cent of maximum scale reading. The items comprising this assembly can be purchased at a cost of between $20 and $25, and can be put together and calibrated with about four hours labor.

The accompanying illustration of the instrument, with the case open, shows two thermocouples coiled in the lid, both of which can be plugged into the panel and used alternately by throwing switch 1-2. Either the 500 or 1000° F. scale can be used by throwing switch 500-1000.

View of portable indicating pyrometer with case open. Note the two flexible thermocouples coiled in case.

A great many uses have been found for this instrument, in addition to oven testing, and it is in demand by field inspectors and service men as well as by the Laboratory workers.

■ ■

Ultimate Customer Freed From Liquefied Gas Tax

IN its General Order No. 12-A, effective April 1, the California State Board of Equalization clarified the motor vehicle tax situation with reference to liquefied petroleum gases used for domestic or industrial purposes. Ultimate consumers no longer need apply for tax refund, the order redefining the term "user" to make it apply to those who fill cylinders for domestic or industrial use, and to public utilities selling liquefied gas through central plant systems. Such "users" may now pay the 3c per gallon motor fuel tax and file claims for refund, instead of passing the tax on to their customers. Motor fuel distributors charging liquefied gas into containers suitable only for domestic or industrial use are exempt from the tax on gas sold in such containers. All sales of liquefied gas for domestic or industrial purposes, except those of public utilities through central plants, are subject to the State 3 per cent sales tax.

■ ■

Calor Gas House Organ

The Calor Gas Co., Ltd., London, England, has begun publication of an attractive consumer house organ entitled "Calor Gas News." The Calor Gas Co., which is a bottled gas distributor, claims a circulation of 100,000 copies for its new promotional publication.

■ ■

Imperial Buys Properties

Imperial Gas Co., Los Angeles, has purchased the liquefied petroleum gas business of Wm. Steeb at Malibu Beach, Calif., and that of C. E. Rathbone at Buena Park, Calif.

The Malibu property has over 100 customers and the Buena Park property has 60.

THE ONLY
HANDBOOK OF
BUTANE-
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GASES

Big Second Edition
Now Available

CONTENTS: Summary of Two Years' Developments: Use in Internal Combustion Engines: Design and Installation of Storage: Supply from Petroleum Refineries: Engineering Data on the Lower Olefins: Domestic Appliance Testing and Utilization: Economic Comparisons with Coal, Oil, Electricity, Producer Gas, Manufactured Gas: Town Plants: Manufacture from Natural Gas: Special Uses: Volume Correction Factors: Supplements and Revisions: Transportation: Use with Other Gases: Analysis and Testing: Properties of Mixtures: Bottled Gas Distribution: Bibliography: Central Plant Directory: Catalogue Section:

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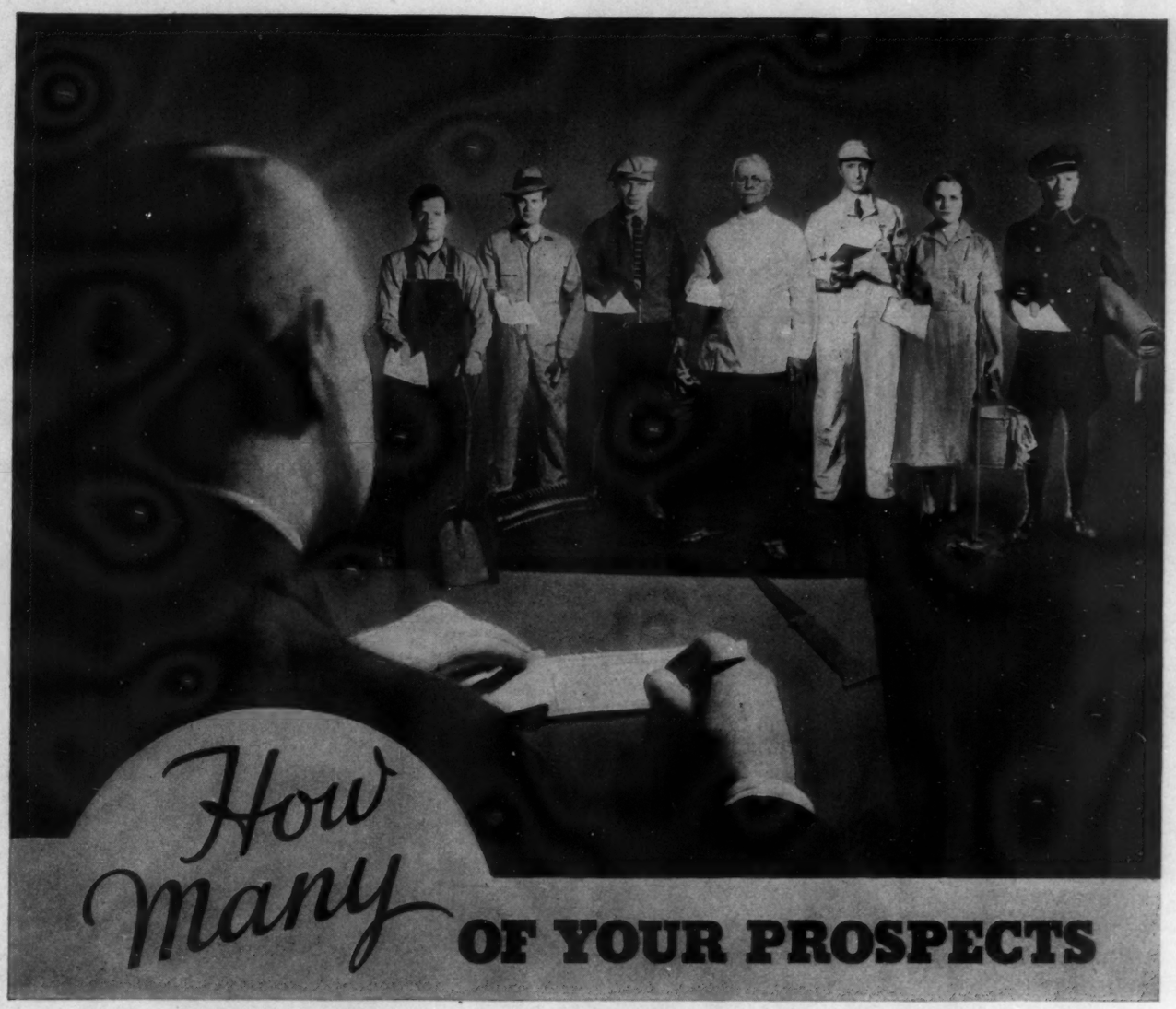
809 South Main St.
Los Angeles, California

Write for circular describing contents in detail.



RECOGNIZE THE HIDDEN COSTS OF OTHER FUELS AND SEMI-AUTOMATIC SERVICE?

How many people actually recognize that the bare fuel cost does not always represent the true cost of old-fashioned heating methods? It's your job and ours to make the public recognize the greater contribution that gas heat and Janitrol Equipment makes to health, comfort, convenience and cleanliness. To help promote the sale of gas heat and make satisfied customers Surface Combustion offers efficient equipment, sales personnel, advertising, and a broad background of merchandising experience.

SURFACE COMBUSTION CORPORATION
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Load Building News
P. C. Gas G. A.
THE MODERN FUEL

COMMITTEE
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Clifford Johnstone
Managing Director
(P. C. G. A.)

Volume 8, No. 5 *Eighth consecutive year of regional cooperative advertising, Pacific Coast Gas Association* May, 1936

MORE THAN ½ MILLION DOMESTIC MAGAZINE READERS OUR AUDIENCE

Regional Home Consumer Media Carry Forceful Messages on Gas Cooking, Water Heating

The Cooperative Advertising Committee presents—

Two full-page advertisements (reproduced in miniature) appearing in Sunset Magazine and Parent-Teacher and Club Women's publications during April and May.

Also a typical article, representative of publicity placed through the cooperation of editors with our Gas News Service.

Advertising Geared to Local Conditions

These advertisements on cooking and water heating are timed to coincide with sales-promotion campaigns of Pacific Coast gas companies, manufacturers and dealers.

Each emphasizes exclusive advantages of gas fuel, through forceful presentation of *positive* sales points that meet (without mentioning) competitive claims and weaknesses.

Each takes cognizance of sales-resistance factors principally met in merchandising gas appliances *on the Pacific Coast*. Each is designed to build *acceptance at the point-of-sale*.

Appliance Dealer Messages

Attracting considerable attention in gas appliance circles is the current P. C. G. A. series of "ads" in *Western Furniture Retailing* and *Western Plumbing and Heating Journal*. Each advertisement features a prominent local dealer who, through cooperation with a Pacific Coast gas company, is doing an outstanding appliance merchandising job.

The Cooperative Advertising Committee invites comment and suggestions. Please communicate through Clifford Johnstone, Managing Director, P. C. G. A., 447 Sutter St. San Francisco.

Electrical Transcriptions Extending Area Covered by "Mystery Chef"

THE Laclede Gas Light Co., St. Louis, Mo., and the Citizens Gas Co., Indianapolis, Ind., are the latest additions to the growing list of companies participating in the radio program sponsored by Regional Advertisers, Inc., which features the Mystery Chef.

At its inception on December 4, 1935, 87 companies were joined in sponsorship of the program in the territory extending from Washington, D. C., to Portland, Me., and from New York City to Buffalo, N. Y. This number has been increased to 103 companies with total domestic gas meters of 5,423,000. Thirteen NBC stations are grouped in a special network which covers the territory served by these companies.

Extension of the program outside the Eastern area has been by means of electrical transcriptions purchased by local utilities. Fourteen companies operating 446,000 domestic gas meters, are now using transcriptions. This raises the total to 117 participating companies, with 5,869,000 domestic meters in operation, making this the largest cooperative project launched to date by the gas industry.

Sale of the 100-page recipe book, "Be An Artist At the Gas Range," during the first four months of the program has been 585,000 copies.

Companies using electrical transcriptions, in addition to those at St. Louis and Indianapolis, are Knoxville (Tenn.) Gas Co., Memphis (Tenn.) Power & Light Co., Chattanooga (Tenn.) Gas Co., Honolulu (T. H.) Gas Co., Peoples Natural Gas Co., Altoona and Greensburg, Pa., Metropolitan Utilities District, Omaha, Neb., Peoples Light Co., Davenport, Iowa, Tide Water Power Co., Wilmington, N. C., Atlanta Gas Light Co., Macon, Ga., Central Illinois Light Co., Peoria, Ill., and Peninsular Utilities Co., Calumet, Mich.

The following companies have requested sample transcriptions to be auditioned for their executives and department heads: Wisconsin Public Service Corp., Green Bay, Wisc., Richmond (Va.) Dept. of Public Utilities, Northern States Power Co., St. Paul, Minn., Birmingham (Ala.) Gas Co., Public Service Co., of Colorado, Denver, Mountain Fuel Supply Co., Salt Lake City, Utah, Muskegon (Mich.) Gas Co., Lone Star Gas System, Dallas, Texas, United Fuel Gas Co., Charleston, W. Va., The Rein Co., Houston, Texas, Central Arizona Light and Power Co., Phoenix, South Carolina Power Co., Charleston, Water & Light Department, City of Duluth, Minn., West Texas Gas Co., Lubbock, Winnipeg (Canada) Electric Co., and Commonwealth and Southern Corp., Jackson, Mich.

Calendar

May

Pennsylvania Gas Association—Annual Meeting, Skytop Lodge, Skytop, N. J., May 5 to 7.

Natural Gas Department, American Gas Association—Annual Spring meeting, Hotel Baker and Hotel Adolphus, Dallas, Texas, May 5-8.

National Fire Protection Association—Atlantic City, N. J., May 11 to 14.

Indiana Gas Association—Annual Convention, Purdue University, West Lafayette, Ind., May 20 and 21.

Industrial Gas Section, American Gas Association—Commercial Gas and Hotel and Restaurant Sales Conference, The Mayflower, Washington, D. C., May 25 and 26.

American Gas Association—Production and Chemical Conference, New York, N. Y., May 25 to 27.

June

American Society of Mechanical Engineers—Dallas, Texas, June 17 to 20.

American Society for Testing Materials—Atlantic City, N. J., June 29 to July 3.

July

American Home Economics Association—Olympic Hotel, Seattle, Wash., July 6 to 9.

Canadian Gas Association—Annual meeting, and *Pacific Coast Gas Association*—Northwest Conference, Hotel Vancouver, Vancouver, B. C., July 8-10.

August

Pacific Coast Gas Association—43rd Annual Convention, Fairmont Hotel, San Francisco, August 25, 26, 27.

September

American Chemical Society—Annual meeting, Pittsburgh, Pa., September 7-12.

Third World Power Conference—Washington, D.C., September 7-12.

October

American Gas Association—18th Annual Convention, Atlantic City, N. J., week of October 26.

November

American Petroleum Institute—Annual Convention, Chicago, Ill., November 9-12.

Indiana Gas Men to Convene May 20 and 21

INDIANA Gas Association will hold its 26th Annual Convention on May 20 and 21, at Purdue University, West Lafayette, Ind. The following tentative program was supplied to *GAS* by P. A. McLeod, secretary-treasurer of the Association:

WEDNESDAY, MAY 20

Opening Remarks by President R. N. Zeek.
Report of secretary-treasurer.
Appointment of Committees.
Address of Welcome—Dean A. A. Potter.
Discussion—"Unaccounted for Gas," led by Guy M. Johnson, general gas supt., Northern Indiana Public Service Co.
Paper—"Evansville's Experience since the Introduction of Natural Gas," C. K. Graham, commercial manager, Southern Indiana Gas & Electric Co.
Report of Professor Leckie on the Work of Purdue Gas Experimental Department.
Informal Banquet—6:30 p.m., Union Building; speaker, John N. Shannahan.

THURSDAY, MAY 21

Paper—"Recapturing the Gas Revenue," A. V. Grief, vice-president, Gary Heat, Light & Water Co.
Address—"Selling Gas Refrigeration in Columbus, Ohio," B. H. Gardner, director of sales, The Gas & Electric Appliance Co.
Report of Indiana Gas Association Advertising Committee, C. V. Sorenson, sales manager, Public Service Co. of Indiana.
Report of committees and election of officers.

H. M. Smith New Head of Mid-West Gas Association

The Mid-West Gas Association's 31st convention, staged at the Hotel Radisson in Minneapolis last month, brought out the membership in force, 300 registrations being recorded and total attendance reaching about 500. Elections at the April 13-15 meeting brought H. M. Smith of the Iowa Public Service Co. into office as president, succeeding F. H. Brooks of Northern Natural Gas Co. E. J. Boyer, Minneapolis Gas Light Co., who acted as general chairman of arrangements for the convention, was advanced from second to first vice-president. S. D. Whiteman of Sioux Falls was elected second vice-president, and R. B. Searing of Sioux City was reelected secretary-treasurer.

■ ■

Pacific Coast Manufacturers May Join A. G. A. E. M.

Affiliation of the Pacific Coast Gas Association Manufacturers Section with the Association of Gas Appliance and Equipment Manufacturers has been approved by the boards of both associations. Negotiations are now in progress which would establish the P.C.G.A. Manufacturers Section as the Pacific Coast Division of the A.G.A.E.M. The matter has been submitted to Pacific Coast manufacturers for mail ballot by W. J. Bailey, chairman of the P.C.G.A. Manufacturers Section.

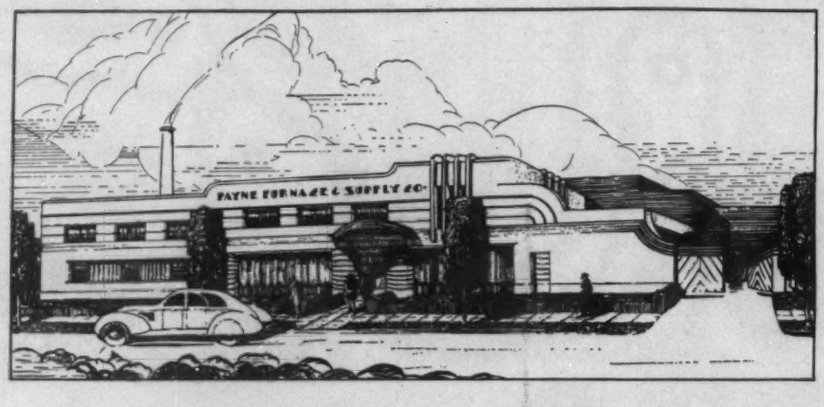
Gas Exhibit at Home Economics Convention

The gas industry will participate with an exhibit at the annual convention of the American Home Economics Association that will be held at the Olympic Hotel in Seattle, Wash., July 6-9. Seattle Gas Co. will have charge of arranging and maintaining the exhibit. Cost of the exhibit will be borne by the American Gas Association and the Pacific Coast Gas Association. The convention will be attended by home economics teachers, dieticians and home service women throughout the country.

■ ■

P.C.G.A. Women's Year Books

The Year Book Contest of the Women's Committee of the Pacific Coast Gas Association is again under way for the current year, according to announcement by Alma Freeburg, chairman of the Committee. A first prize of $25 and a second prize of $15 will be awarded the two books judged to be best at a contest exhibit at the P.C.G.A. Convention.



Artist's sketch of new Payne offices at Beverly Hills, Calif.

Expansion at Payne Headquarters

CONSTRUCTION of new offices and a considerable expansion in production and shipping facilities is now under way at the factory of the Payne Furnace & Supply Co., Beverly Hills, Calif., manufacturers of gas-fired floor and basement type furnaces, air conditioning equipment, circulating heaters and gas venting materials.

The modernization plans, according to E. L. Payne, vice-president and general manager, will extend throughout the entire plant and will reflect careful study of the latest and best methods for increasing the efficiency of the entire organization.

The architect, William J. Gage, has expressed in this building an architectural design which combines the picturesque with the utilitarian. Deviating from the usual industrial structure, the building will be decidedly modern and Mr. Gage has worked the separate units of the existing building and the new addition into a picturesque mass. This is considered of great importance since the Payne factory is located in close proximity to the finest residential district in Southern California, and many visitors from all over the world are attracted to this location. It has also been the policy of the company to invite the public to visit the factory and provision is being made for the reception of visitors. This policy has proved of educational value to the gas heating industry and of sales value to the Payne company.

Principal among the building plans is the addition of a second story to augment the factory space approximately one third, thus permitting the revamping of the production departments, allowing for the installation of new and modern bake ovens for the paint department, to facilitate the handling of greater quantities of finished products, and increasing the shipping facilities approximately 400 per cent.

A two-story office building will be added to the present structure, and the whole facade modernized through a treatment of stucco and metal motifs. This building will include a display space with a model basement planned for demonstration purposes. Executive offices will occupy a portion of the first floor and on the second floor will be an assembly room seating approximately 150 persons, which will be used for sales conferences, public lectures and demonstrations. A kitchen in conjunction with this room will be so arranged that it can be utilized as a model kitchen. The office building will be air conditioned throughout by means of a gas-fired air conditioner.

The present building program climaxes 22 years of steady growth and development since the company first began business in a small sheet metal shop in downtown Los Angeles. While the major portion of its products are sold in the natural gas districts, during recent years representation has been established in almost every state in the Union and an export department has been added to handle the detail of shipments to foreign countries.

■ ■

Southern Counties Celebrates Silver Anniversary

CELEBRATING the 25th anniversary of the organization of Southern Counties Gas Co., 32 members of the concern honored Ferdinand R. Bain, founder and present chairman of the board with a "Silver Anniversary Dinner" at the Biltmore Hotel, Los Angeles, Monday evening, April 13. LeRoy M. Edwards, general counsel, acted as toastmaster.

In commemoration of the occasion, a tribute to Mr. Bain's faith in the business potentialities of Southern California and his vision in organizing the company was paid by President Franklin S. Wade, who has been associated with the company since its inception.

Southern Counties Gas Co. was organized by Mr. Bain in 1911, at which time the company's product was wholly manufactured gas, distributed to about 3,000 customers. Today the company serves 154,970 customers with natural gas from mains connected with practically all the gas producing oil fields in California.

Beginning in 11 small communities in Los Angeles and Orange counties with the service of manufactured gas from 7 small plants, the system now extends through five counties and serves more than 70 communities, including Santa Barbara, Ventura, Pomona, Whittier, Santa Ana, Venice and Santa Monica, through 3,692 miles of transmission facilities.

As an interesting sidelight, records of the company disclose that transportation equipment in 1911 consisted of one horse and wagon, with one or two motorcycles and a few bicycles. Today a fleet of 380 automobiles and trucks is required to maintain service to present customers.

■ ■

Robertshaw Sponsors Cooking Demonstration Contest

The Robertshaw Thermostat Co. is sponsoring a "Measured Cooking Week" contest from May 4 to 9 among home service directors of gas companies. The home service departments will compete for prizes on the basis of the best cooking and baking demonstrations staged on Robertshaw-equipped gas ranges.

Judges for the contest have been selected as follows: Miss Ada Bessie Swann, director of the Home Service Center, "Woman's Home Companion"; Miss Alice Bradley, principal, Miss Farmer's School of Cookery, Boston; Miss Inez Searles Willson, director of the Department of Home Economics, National Live Stock and Meat Board, Chicago; and H. T. Ryan, Robertshaw Thermostat Co.

A total of 25 prizes, representing $1000 in cash, will be awarded by Robertshaw to winning contestants. The prizes will be divided as follows: First prize, $300; second prize, $200; third prize, $150; fourth prize, $100; fifth prize, $50; and 20 honorable mentions carrying cash awards of $10 each.

SERIES 10 CIRCUIT

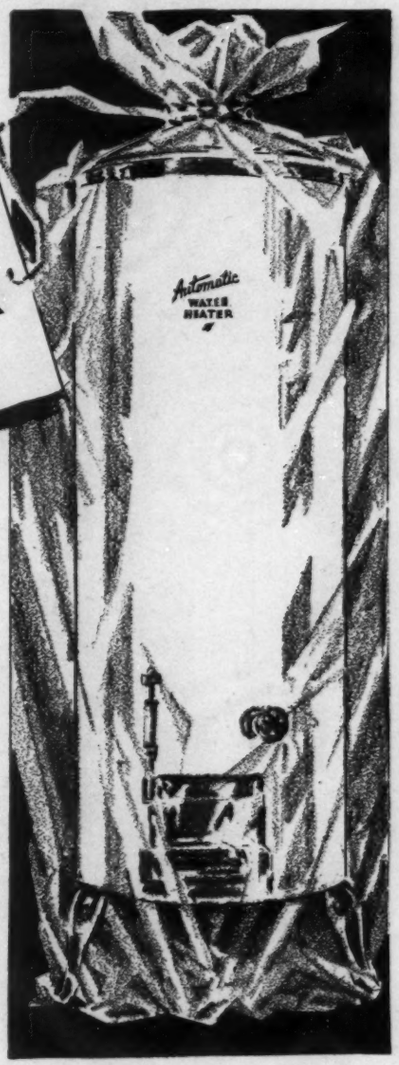
Exclusive with Minneapolis-Honeywell

ONLY Minneapolis-Honeywell can offer the control performance made possible by the exclusive Series 10 Circuit. That is one important reason why it pays to standardize on this superior line of controls. In addition your service department can operate more efficiently and will have fewer calls, and your stock room will have to handle only one line to fill all control requirements. Minneapolis-Honeywell Regulator Co., 401 East 28th Street, Minneapolis, Minn.

MINNEAPOLIS HONEYWELL

Control Systems

Automatic
WATER HEATER
CAMPAIGN



P·G·and E·
PACIFIC GAS AND ELECTRIC COMPANY
Owned · Operated · Managed by Californians

NEVER BEFORE a campaign like this! • To start with, REDUCED NATURAL GAS RATES. • Then—TWELVE FIFTY trade in allowance. • Promotional advertising in NEWSPAPERS. • Promotional advertising on BILLBOARDS. • PLUS cooperative DEALER advertising . . . P. G. and E. to pay 1/3 the space cost. Details of this, and other features of the campaign, were fully explained in a recent bulletin. If you didn't receive this bulletin, call our local office at once. Yes, the drive will take in ALL towns and cities where the P. G. and E. serves gas. May 1 to 28, inclusive.

●

A UNITED *Gas* INDUSTRY EVENT

WG-205-536

Counsel Named for National Advertising

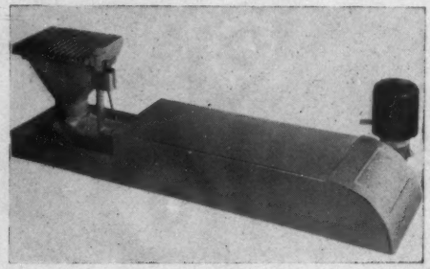
HERMAN RUSSELL, chairman of the Committee on National Advertising of the American Gas Association, announced on April 22 that McCann-Erickson, Inc., of New York, had been selected as the agency to handle the national advertising account of gas as a domestic fuel. Mr. Russell announced at the same time that Ketchum, MacLeod & Grove, Inc., Pittsburgh, Pa., present advertising counsel of the Advertising Committee of the Industrial Gas Section, had been appointed to handle the commercial and industrial phases of the program.

McCann-Erickson is a well-known advertising agency with offices in Cleveland, Detroit, Chicago, Denver, San Francisco, Los Angeles, Seattle and Portland (Ore.). It also has Canadian offices in Montreal, Toronto, Winnipeg and Vancouver. As the agency in charge of the Association's industrial gas advertising account, Ketchum, MacLeod & Grove, is thoroughly familiar with competitive and other conditions in that particular field.

Working with the agencies in formulating basic policies and a detailed plan of action will be a committee representing companies participating in the national advertising program. The first meeting of this committee was called at Association Headquarters, New York, on April 29th.

Sonner Burner Introducing New Line

THE Sonner Burner Co. of Winfield, Kan., is introducing a new line of gas conversion burners known as type "L." These burners are designed to provide accurate and positive control and distribution of the three major elements of gas combustion, primary air, secondary air, and gas; to operate on any of of the commercial gases without the difficulties of flash back, and over heated head castings; to produce a high combustion



efficiency over a wide range and variation in operating conditions; and to provide a conversion burner which is easily installed and adjusted.

The new burners are constructed with a deep narrow slot for the emission of the combustion mixture instead of the usual drilled port. The purpose of the slot is to promote stable flame conditions and at the same time to provide a means for distributing secondary air to all parts of the fire. An increase in the cooling surface on the burner head prevents the build up of excessive temperatures in the burner castings.

The type "L" burners are built in two sizes and have a range of input from 50,000 B.t.u. per hour to 300,000 B.t.u. per hour. Each size is housed in a draft box containing the automatic pilot and all the air adjustments. All the parts are readily accessible yet the entire assembly is compact.

■ ■

Bill Complaints Forestalled by Oklahoma Natural

With one of the coldest winters in history on hand to run up high gas consumption, the Oklahoma City commercial office of Oklahoma Natural Gas Co. is giving considerable effort to keeping down the number of high bill complaints. When a meter reader encounters what seems to be an unusually high consumption reading, he turns in an investigation order and a check on the customer's premises is made before the bill is rendered.

When the billing department discovers an account showing extraordinarily large consumption, the account is put on a re-read ticket for checking before the bill is sent out.

■ ■

Gas Flares for London Fog

London police are experimenting with gas flares to guide motorists through the fogs for which the city is known. The new flares are intended to replace acetylene torches now in use. The gas flares can be connected directly to gas mains and folded up and stored in boxes sunk in the pavement when not in service.

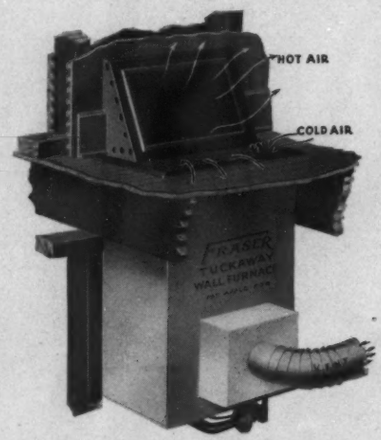
Profitable DITCHING

With Barber-Greenes

There are Four Barber-Greene Ditchers—
The Standard
The Pipeline Special
The Utility Special
The Service Special
You can have the many advantages of the exclusive B-G Vertical Boom in a machine designed for your peculiar needs. Ask for complete information, there is no obligation.

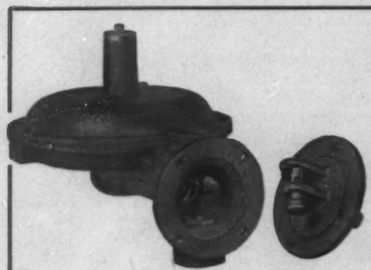
BARBER GREENE
715 West Park Ave.
Aurora, Ill.
36-17

FRASER
TUCK-A-WAY



An entirely new idea in Furnace Construction
Made in 4 sizes

Manufactured by
Fraser Furnace Company
Stockton, Calif.
Distributed by
H. R. Basford Company
San Francisco Los Angeles



Weight Loaded; Spring Loaded or Combined Weight and Spring . . . With or Without Mercury Seal . . . Convenient Vent . . . No threaded or flanged parts under high pressure.

Service Regulators
Connelly Type GV

Pounds to pounds or pounds to inches . . . Efficient Control . . . Fully Accessible . . . Double guided, renewable stream-lined, soft-seated valve gives increased capacity . . . Easy replaceable valve port for changed condition . . . All parts can be inspected or serviced without removing Regulator from line.

Write for Bulletins
Connelly Caloroptic—BTU Indicator
Regulators—Station, District, Service, Appliance
Back Pressure Valves . . . U-Gauges
Iron Sponge (Ready Mixed)
Iron Oxide (Unmixed)

CONNELLY IRON SPONGE & GOVERNOR COMPANY
Chicago, Ill. Elizabeth, N. J.
N.E. Agt.: Theo. H. Piser, Waban, Mass.

Booklet on Competitive Sale of Gas Cooking Service

W. E. Leverette, commercial manager of the Nashville (Tenn.) Gas and Heating Co., has published a booklet compiled from selling and competitive studies that have been made under actual home conditions on the subject of gas cookery, entitled the "Four 4's of Complete Gas Cooking Service." The title is derived from the four main divisions of the book which discuss the superiority of gas as a cooking fuel over the three other fuels, electricity, kerosene and coal. These divisions are Cooking Results, Utility and Application, Modernity, and Complete Cooking Costs. Each of the main divisions is broken down into four contributing factors pointing to the superiority of gas. Hence the "Four 4's."

The booklet is illustrated with a number of animations, drawings and modern kitchen views and contains 22 pages. It is written in a brief manner and is designed for distribution to company employees and dealers that are selling gas cooking service.

Mr. Leverette is offering the "Four 4's" for sale in quantity lots to gas companies. The last page is printed to order to carry the local message. Further information may be secured by addressing Mr. Leverette.

■ ■

Consumers Power Co. New Price to Producers

From headquarters of the Consumers Power Co. at Jackson, Mich., announcement has been made of an increase in price of natural, gas paid to producers, to 15 cents per 1,000 cu. ft. at the well head superseding a price of 12 cents per 1,000 ranging downward to 9 cents per 1,000. The company has also announced that it will bear the compression costs formerly borne by producers.

The new rates will be very favorably received, it is thought, by farmers and landholders who have not been satisfied with the former prices paid for natural gas. It is also expected that the increase will bring about considerably more "wildcating" in the Michigan fields.

Consumers Power has purchased the stock of Petroleum Transportation Co., a gathering unit, organized in April 1935 as a common carrier for six production companies, and will continue to operate the company in its function of gathering gas at the wells.

■ ■

Special Offer to Feature P. G. and E. Drive

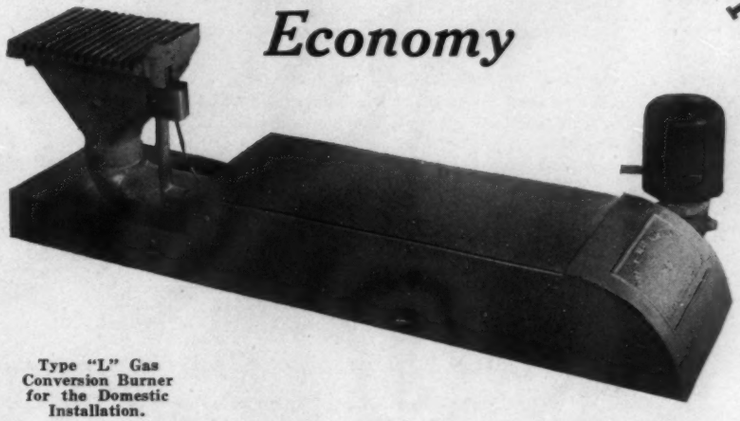
Pacific Gas and Electric Co., San Francisco, and the dealers in its territory will cooperate during May in an offer of $12.50 trade-in allowance on any old non-automatic type of water heater to apply on any automatic heater selling for $50 or more. Featured also in the campaign are the new reduced gas rates (see *Western Gas* for April) announced by P. G. and E. which became effective on May 1.

Advertising is to include newspapers, posters, truck banners, and bill stickers, to be supplemented by several mail broadsides and by window and floor displays.

CONTROLLED COMBUSTION

SPELLS

Economy



Type "L" Gas Conversion Burner for the Domestic Installation.

SONNER'S New Type "L" CONVERTER

CONTROLS ALL

PRIMARY AIR **3** SECONDARY AIR

GAS

Sonner offers you, in its new Type "L" Heat Machine, a gas conversion burner for domestic installations that provides positive control and distribution of the three major elements of gas combustion; primary air, secondary air and gas.

A single compact unit with eye appeal, that is easily installed and readily adjusted; a burner that provides high combustion efficiencies over a wide range of operating conditions.

For full information and prices write or wire.

SONNER BURNER CO. WINFIELD, KANS.

AIR CONDITIONING

Electrogas

HEATING EQUIPMENT

FURNACES BLOWERS FILTERS WASHERS

Write for attractive Dealer proposition

ELECTROGAS FURNACE & MANUFACTURING CO.

2575 Bayshore Boulevard, San Francisco

REFRACTORIES

GENERAL CERAMICS COMPANY

• REFRACTORIES •

For Conversion Burners, Circulating Heaters, etc.

Because they are uniformly accurate, strong, and dependable in every way, General Ceramics Refractories are used by most of the leading manufacturers of gas heating appliances. • Our engineers will gladly cooperate with you.

General Ceramics Company, 30 Rockefeller Plaza, New York

GOODMAN USED SINCE 1897 2" HANDLE & LOCKING SLEEVE GAS MAIN STOPPER

The Goodman Stopper

The Reliable Shut-off for Street Mains

Equipped with Improved Patented Locking Sleeve, which locks both handles to the pipe. Stopper cannot slip. Gas cannot pass.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, N. Y.

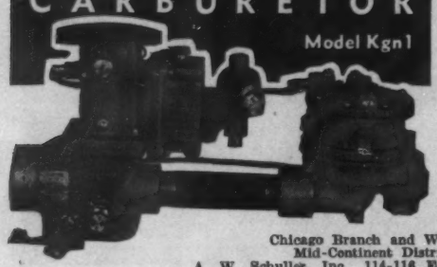
Pac. Coast Rep.: C. B. Babcock Co.
135 Bluxome Street
San Francisco, California

COMBUSTION EQUIPMENT

For every firing and controlling requirement including a full line of the finest conversion burners ranging in price from 7.50 to 150.00.

NEMEC COMBUSTION ENGINEERS, WHITTIER, CALIF.
San Francisco, 780 Bryant St. Phoenix, 530 W. Adams

ENSIGN COMBINATION Gas & Gasoline CARBURETOR Model Kgn1



SAVE ON FUEL

The Ensign Combination Carburetor permits using both gas and gasoline for fuel, changing easily from one to the other while engine is operating. Purchase of fuels at favorable prices assures low fuel costs. Less fuel consumption without waste, and better engine performance insures minimum overall power costs. A scientific precision device with more than 16 years' successful performance in various classes of service. Made for all types of multi-cylinder stationary engines. Simple. Easily installed. Fully guaranteed. Write for name of nearest dealer.

Ensign Caburetor Company, Ltd.
7010 S. Alameda St., P. O. Box 606
Huntington Park, California

Chicago Branch and Warehouse: 2644 So. Michigan Ave., Chicago, Ill.
Mid-Continent Distribution and Service Facilities Maintained By:
A. W. Schuller, Inc., 114-116 E. 9th St., Tulsa, Okla.; The Binkley Co., Oklahoma City, Okla.; Portable Rig Co., Houston, Dallas and Longview, Texas.

Dissimilar Metal Corrosion in Soils

(Continued from Page 21)

dissimilar metal corrosion in soils cannot be drawn from experience in salt water.

2. The residual potential difference between polarized copper and steel is much greater in some soils than in others. In one soil it was found to be 0.005 volts and in another 0.200 volts.

3. The corrosion due to dissimilar metals is of negligible importance in the former soil and of uncertain importance in the latter soil.

4. The relative area of the copper and steel electrodes is a very important factor in determining the rate of corrosion of the steel.

A comparison of the potential differences produced by oxygen concentration cells with those produced by copper-steel cells, and a comparison of the resistance of the two types of cells, show that:

1. Potential differences can be produced by oxygen concentration cells that are as great or greater than those produced by copper-steel cells.

2. The resistance of copper-steel cells, when the two metal surfaces are separated by at least 3 feet as they are in our distribution system, is from five to seven times the probable resistance of oxygen concentration cells in similar soils.

3. These two facts make it seem unlikely (but do not prove) that dissimilar metal corrosion will be the determining factor in fixing the life of the steel pipe used in conjunction with copper pipe in our distribution systems.

4. Further tests, covering a long period of time, in which the actual rate of penetration of steel samples connected to copper is compared with the rate of penetration of similar samples not connected with copper, are required to prove or disprove the preceding conclusion. Such tests are now in progress.

■ ■

Modernization Committee Issues Call for Photographs

To assist gas companies in planning home modernization activities, and to cooperate with newspapers, magazines, manufacturers and schools interested in home modernization, the Home Modernization Committee of the American Gas Association maintains a file of photographs of modern kitchen and basement interiors for their use. In order that the file might have an adequate supply of photographs at all times, Harry Swenson, chairman of the Home Modernization Committee, has issued a call for contributions of such interior views.

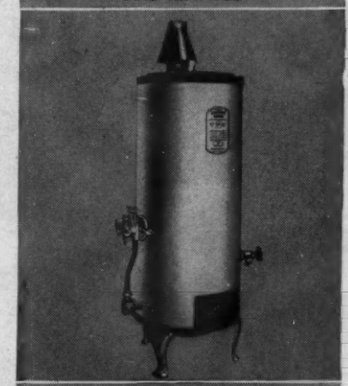
In addition to this service, sets of plans for the construction of model kitchen and basement demonstration trailers are available from the Committee.

■ ■

McGehee Sales Manager

L. M. McGehee, of the Oklahoma City office of Oklahoma Natural Gas Co. since 1928, has been promoted to the position of district sales manager for the company's Ardmor district. Mr. McGehee succeeds C. C. Baker, who resigned.

GAS MANTLE



HOTZONE GAS WATER HEATER

HOTZONE BROILER-GRIDDLE

ANOTHER

Welsbach *ACHIEVEMENT*

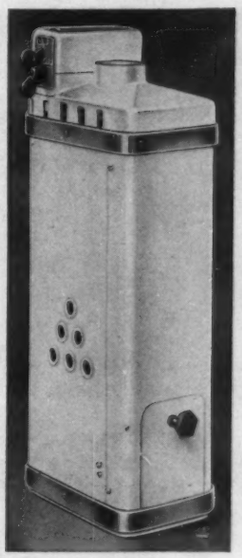
THE HOTZONE "NUMBER SEVEN"

AN AUTOMATIC CONVERSION GAS WATER HEATER THAT IS DIFFERENT.

***Beautiful*—Plenty of eye appeal with its white baked enamel finish and satin aluminum trimmings.**

***Silent*—using the famous Welsbach luminous flame burner—100% safety gas shut-off. Maximum input 5000 B.T.U.**

***Automatic*—Welsbach Graduating direct acting thermostat controls temperature of water.**



HOTZONE
NUMBER SEVEN

Welsbach Company

Gloucester City, N. J.

BRANCHES IN CHICAGO AND SAN FRANCISCO

Since 1887 Pioneers in the Manufacture of Gas Burning Appliances

BLAW-KNOX GAS CLEANERS

BLAW-KNOX GAS CLEANERS

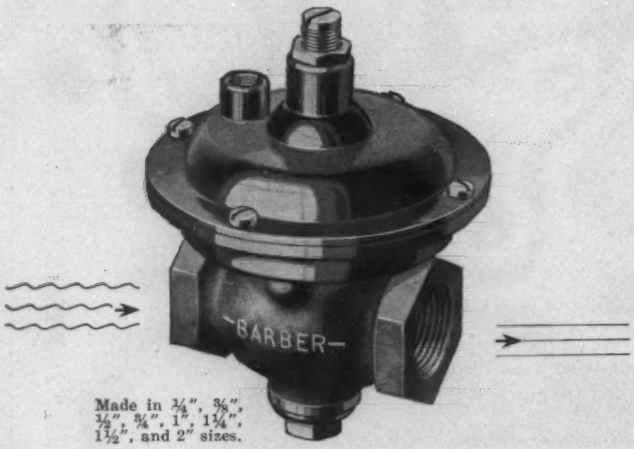
FULFILL ALL PERFORMANCE CLAIMS. REDUCE SERVICE CALLS, PILOT LIGHT OUTAGES AND PROVIDE FOR MORE SATISFACTORY PUBLIC RELATIONS. ELIMINATE COMPRESSOR BREAKDOWNS THAT ARE DUE TO DUST IN THE GAS.

A small investment in Blaw-Knox Gas Cleaners protects expensive equipment

BLAW-KNOX

BLAW-KNOX COMPANY

2033 FARMERS BANK BUILDING · PITTSBURGH, PENNA.



Made in ¼", ⅜", ½", ¾", 1", 1¼", 1½", and 2" sizes.

Be Sure the Appliances You Sponsor are Equipped with

BARBER

A. G. A. Approved

Gas Pressure Regulators

FOR your own protection, as well as the consumer's, every gas burning appliance you install requires a dependable Pressure Regulator—either as an accessory or on the supply line. This and only this assures constant pressure of fuel supply—with consequent safety of operation, and with proper economy which reduces gas bill complaints and service calls.

On so vital a piece of equipment why take chances? Barber Gas Pressure Regulators are listed in the A. G. A. Directory of Approved Appliances, thus complying with stringent requirements as to pressure drop and precision of operation. Compact design, all bronze bodies—a product of BARBER QUALITY down to the last detail. Very moderately priced for a Regulator of this quality.

Write for complete literature, prices and discounts on the entire Barber line of Burners and Regulators.

THE BARBER GAS BURNER COMPANY

3704 Superior Ave., Cleveland, Ohio

Death Brings Close to Varied Career of H. O. Caster

H. O. CASTER, member of the Henry L. Doherty & Co. executive committee and director of the American Gas Association, died on April 14. His death brings to a close a varied and eminently successful career as an educator, a public servant, a corporation executive, and as the associate head of the oil and gas activities of Cities Service Co.

H. O. CASTER

After attending rural schools in Kansas and Oberlin (Kan.) High School, Mr. Caster was graduated from Ottawa University in 1898. Following his graduation he was elected supervisor of the Oberlin public schools. For six years he was a member of the board of directors of the Board of Education for the city schools in Oberlin.

In 1900 he was elected county superintendent of schools for Decatur County, Kan., and re-elected in 1902.

He was admitted to the Bar in Kansas in 1906, and practiced law in Oberlin. In 1908 he was elected county attorney for Decatur County. From 1911 to 1914 he was engaged in the private practice of law. In 1914 he was appointed attorney for the Kansas Public Service Commission.

On January 1, 1918, he resigned from this position and again entered the private practice of law, this time in Topeka, Kan., where he was affiliated with the well-known firm of Stone and McDermott.

On May 1, 1919, Mr. Caster entered the employ of Henry L. Doherty & Co. as general counsel for the Empire Gas & Fuel Co. of Bartlesville, Okla., which position he occupied until September 20, 1925, when he entered the New York office as a member of the executive committe. From 1923 to 1925, he was chairman of the board of education for the city schools in Bartlesville.

Mr. Caster was an officer and director of 46 corporations, including such companies as Arkansas Natural Gas Corp., Cities Service Co., Crew Levick Co., Dominion Natural Gas Co., Ltd., Empire Gas and Fuel Co., Federal Light and Traction Co., Kansas City Gas Co., Louisiana Oil & Refining Corp., and the Natural Gas Pipeline Co. of America. In 1933 he served as president of the American Gas Association.

■ ■

Adverse Report Made on Public Ownership at Sacramento

PRIVATE ownership of gas facilities received a most convincing vote of confidence in Sacramento, Calif., early last month, when Jas. S. Dean city manager, made his report on the feasibility of installing a municipal natural gas system in the city. The Pacific Gas and Electric Co. now serves Sacramento with both gas and electricity. The city manager made a study of the municipal ownership question at the instruction of the city council which passed a resolution to that effect on February 13.

Studies of the operation of the municipal systems in Long Beach and Palo Alto, Calif., led to the following cost estimates for a Sacramento system:

An investment of 4 million dollars would be required; annual operating expense including the purchase of gas at the city gate at 35c per M c.f. would be approximately $731,400; bond interest and depreciation, $225,000; loss in revenue to the city from taxes now paid by P. G. and E., $96,000 annually; and an annual capital layout of $25,000 would bring the total to $1,077,400.

P. G. and E.'s gross annual revenue under its recently announced rate reduction which becomes operative on May 1, is about $1,002,000. Therefore, the municipal system would incur an annual deficit of $75,400 by charging the company's new rate.

The 4 million dollar estimated investment includes a 5 per cent allowance for severance damages, but does not include the P. G. and E. standby oil gas plant, the value of which is placed at $1,400,000 by the California Railroad Commission.

Last year the proponents of public ownership in Sacramento managed to pass a 12 million dollar bond issue in a municipal election for the construction of a utility district electric generating plant and distribution system. However, to date the matter has progressed no further.

Summer Water Heating in Chicago

(Continued from Page 38)

gage storage; and freedom from the inconvenience of frequent ordering of fuel.

In large apartment building areas, no small part of the cost of cleaning and decorating elaborate building interiors and expensive furnishings can be traced to the handling of coal and ashes. This cost is not always in proportion to the amount of fuel burned either, since windows and doors are more likely to be left open during the warm months, permitting the infiltration of more dirt.

The cleanliness and convenience of automatic gas service for heat and hot water, even if only for part of the year, should be an asset in the rental or sale of apartments. These advantages, together with the possibility of both direct and indirect savings, make gas, as an off peak boiler fuel, worthy of the fullest consideration by operators of large apartment buildings.

Strange as it seems, the intangibles which at first seemed so hard to sell in this field, invariably prove to be the salient features of the gas installation.

■ ■

Purification Plant at Jal, N. M.

(Continued from Page 43)

A radical departure was made from the conventional type of aerating tower. These aerating towers, three in number, are 12- by 12- by 60 feet high and are open on the front side only. The air required to reactivate the foul soda ash solution is drawn through the tower by means of a 60,000 cubic feet per minute Sirocco No. 10 exhaust fan driven by a 15 h.p. steam engine.

Nearly all of the hydrogen sulphide is removed from the solution by this method and loss of solution and soda ash is practically eliminated.

The smaller photograph on page 43 shows the front and side of one of the aerating towers from the concrete basin of which leads a 12-inch suction line to a surge tank located near the pump house where water and soda ash are added to the solution as required.

This new plant has been in operation for the past five months. During that time the operating cost has been materially reduced and plant shut down time has been practically eliminated.

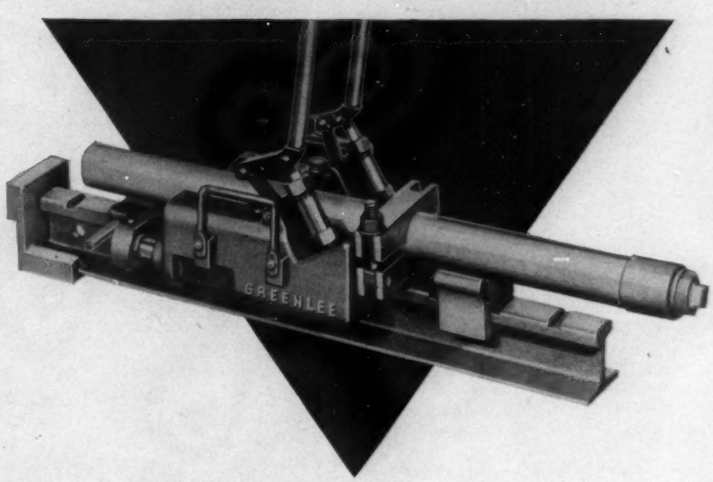
■ ■

Nettles Elected President Tampa Gas Co.

Rosco Nettles, manager of Tampa (Fla.) Gas Co. since 1910, was recently elected president of the company, succeeding John Gribbel who was elected chairman of the board. J. Bancker Gribbel was elected vice-president and treasurer, and Harry M. Eberhard, secretary.

Mr. Nettles was 24 years of age when he was named manager of the company. In his new capacity he will continue as manager.

Push Pipe the Easy Way



Greenlee Hydraulic Pipe Pusher

Much time and labor can be saved by using the Greenlee Hydraulic Pipe Pusher, as compared to trenching or using a pusher that requires so much man power to operate it. With the Greenlee, one man can stand in a comfortable position and exert a pressure of 40,000 pounds on the pipe clamp. Eight speeds are provided for varying soil conditions.

The Greenlee Pusher is self-contained. It operates on a notched steel base, which can be furnished in various lengths. After forcing the pipe forward 4 inches, the handles are depressed to release the pressure while springs within the body quickly bring the pistons up to a new notch. This operation is repeated until the end of the base is reached, when the machine is pushed to the opposite end and the pipe clamp reset. This means that pipe clamps are changed only every 4 to 7 feet, depending on the length of rail used.

It will pay you to investigate this improved method of making underground installation of pipe, because of the savings that can be made. A letter or postcard will bring complete information. No obligation on your part, of course.

Write Now for Complete Details

GREENLEE TOOL CO., 1700 Columbia Ave., ROCKFORD, ILL.

Western Gas

is compressed by

COOPER-BESSEMERS

50 to 1600 horsepower

THE COOPER-BESSEMER CORPORATION
640 East 61st St. Los Angeles, Calif.
PLANTS: Mt. Vernon, Ohio — Grove City, Pa.

CURB
METER INSTALLATIONS

Investigate the practical advantages of ART CONCRETE SECTIONAL METER BOXES now extensively used by leading gas distributors.

Complete protection for curb meters. Furnished in combinations suitable for single and multiple set-ups, low and high pressure. Length of box readily extended without removing initial installation. Knockouts for pipe connections. Reinforced concrete covers and lids standard—cast iron optional.

Also round curb valve boxes in different sizes, fitted with break-away grooves for varying depths.

ART CONCRETE WORKS
Originators and Manufacturers
366 S. Fair Oaks Ave., Pasadena, Calif.
Oakland, Calif. Birmingham, Ala.
Jacksonville, Fla.

P. G. and E.'s Milpitas Line

(Continued from Page 45)

No other form of expansion joint was used on the line nor were any of these joints used except at valve locations.

Special double bell angles were made in the mill for use in all bends in the line. They were made up for different angles, so that it was not necessary to make field angle welds, which have not the same strength. Approximately 1,000 of the manufactured bends were used.

Ordinary blow-off type drips were welded on the bottom side of the line at all low places where liquid might collect.

The line was laid across small ravines without any support except the natural banks but, on longer spans, concrete piers were located at each side of the crossing. Over one creek crossing the pipe was placed well above the water by using vertical angles; this was done to protect the line in case of flood conditions. At that point, it was deemed inadvisable to go under the creek.

After passing just south of the city of Palo Alto and Stanford University, the line goes north through hilly and wooded country, passing close to the town of Woodside, following the general course of the Skyline Boulevard and lying near the Crystal Springs Lakes of San Francisco's Water System. South of the line between San Francisco and San Mateo Counties, it goes in a northeasterly direction, joining a 26-inch main constructed three years ago from that point to the Potrero Gas Plant in San Francisco, the main point of sendout for the city.

The Pacific Gas and Electric Co. invested approximately $1,650,000 in the construction of this new project; 13½ miles of the line were built by the company's own construction forces and the balance, or 31½ miles, was built by local contract.

One singular feature of the project was the fact that all of the pipe was made in San Francisco, which also helped greatly the local employment situation.

In going north "Up the Peninsula," as located, the line traverses some very rough country, being laid through the hills that lie between San Francisco Bay and the Pacific Ocean. It also crosses many ravines and stream beds, which added to the difficulties of hauling and constructing the line.

Practically all of the line was dug by machine, but there were places where rocky formation was encountered, and it was necessary to resort to dynamite to blast out the trench.

Additional measuring facilities had to be installed at Milpitas Terminal to account for deliveries to the new line and, of course, meters and regulators were installed at the northern end.

The new line is 45 miles in length and provides a source of gas supply for the town of Woodside and also a small settlement known as Woodside Highlands.

INLAND
GAS SPECIALTIES
Designed . . .
★ to meet a definite need

★ **Boost unit heater and gas burner sales — cut down maintenance and service costs—assure yourself of satisfied customers by specifying Inland Gas Specialties on every installation.**

★ **Send for our illustrated folder describing the complete line of Inland Products — Unit Heater Hanger, Canopy and Gas Cock Switch — Adjustable External Lighter, Safety Gas Cock, Copper Fire Pot Coils and Furnace Door Closer.**

INLAND
GAS SPECIALTIES
INLAND MANUFACTURING COMPANY
(Dept. 2) 1120 North Cicero Ave., Chicago, Illinois

C. L. Krause Claimed by Death

APRIL 14 brought to a close the long career of Charles L. Krause, who had been gas engineer with the Union Gas and Electric Co., Cincinnati, Ohio, for 52 years. He died in his home, following a heart attack, at nearly 74 years of age.

C. L. KRAUSE

Mr. Krause started with the gas company when he was 21 as a pipe fitter, at $12 a week. His first duty with the firm, then the Cincinnati Gas Light and Coke Co., was to repair damage done by the raging waters of the record Ohio River flood of 1884.

Mr. Krause's first significant promotion with the company came in 1897, when he was placed in charge of the old Avondale Station. Moved to the central office in 1905, he remained there as a gas engineer.

During Mr. Krause's time as gas engineer for the Union Gas and Electric Co., he designed many types of industrial gas burners, which were later adopted and patented by various manufacturers. In the early days of industrial gas equipment his services were requested by a number of gas companies in the United States, and he could be rightfully called a pioneer in the application of gas for industrial purposes. From 1906 to 1920 he was personally responsible for the design, sale and use of all industrial gas equipment in Greater Cincinnati.

A daughter, Mrs. Harry Oberhelman, with whom he made his home, and a sister, Mrs. Augustus Koester, Cincinnati, survive him.

■ ■

Added Capacity for So. Calif. Kettleman-Los Angeles Line

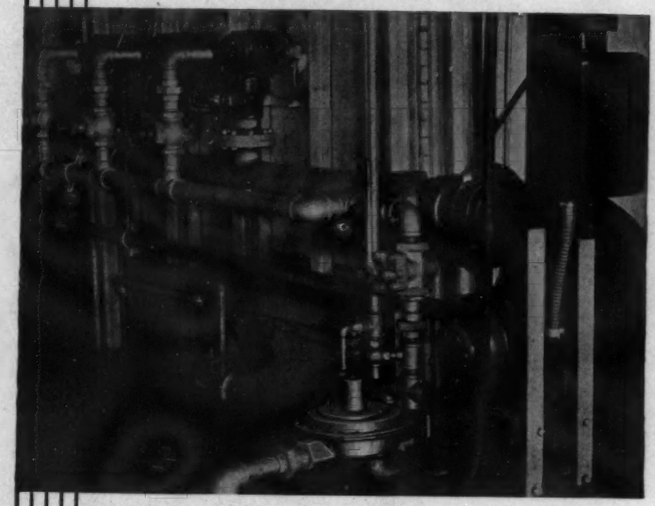
Southern California Gas Co., Los Angeles, last month completed tying in the second of its 8-inch lines from the North Belridge Field in San Joaquin Valley. The line runs 1½ miles from the Cowan gasoline plant to the company's main Kettleman-Los Angeles transmission line. It provides added capacity for the company's system drawing out of the North Belridge Field, from which 70 to 80 million cu. ft. of casinghead gas is being taken daily.

■ ■

New Office for Medford, Ore.

Southern Oregon Gas Corp. has purchased a site in Medford for the construction of a new office building which together with the cost of the structure will represent an investment of about $22,000. The building will be 50 by 100 feet and will have display rooms, laboratories and shops in addition to offices. Construction was begun about April 1, the building to be ready for occupation early in June.

Industrial



A Reynolds Industrial Regulator in service at the Chicago Heights Plant of the Columbia Tool Steel Company.

Greater capacity . . . increased range . . . quicker response . . . these are decided advantages of Reynolds Improved Gas Regulators for industrial control. They assure smooth, constant outlet pressure and volume even though inlet pressure and volume are irregular. Manufactured in single or double valve construction, Reynolds Industrial Regulators are proved by performance in factory tests and on installations throughout the world.

REYNOLDS PRODUCTS

High Pressure Service House Regulators—Straight Lever Type—Models 0-10-20 series; Toggle Lever Type—Model 30 series.

Low Pressure Service or Appliance Regulators.

District Station Regulators, Single or Double Valve—Auxiliary Bowl and Automatic Loading Device Optional.

High Pressure Line Regulators—Pilot Loaded—Pilot Controlled.

Toggle Type Regulators—Single Valve, Double Valve, Triple Outlet.

Seals—Dead Weight or Mercury. Back Pressure Valves . Automatic Quick Closing Anti-Vacuum Valves . Automatic Shut Off Valves . Lever Operated Valves . Louver Operated Device . Atmospheric Regulators . Vacuum Regulators.

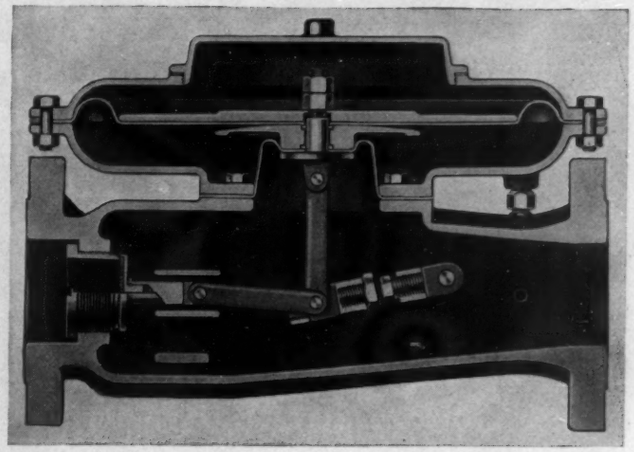
Branch Offices:
421 Dwight Building
Kansas City, Mo.
2nd Unit,
Santa Fe Bldg.
Dallas, Texas

Representatives:
Eastern Appliance Co.
Boston, Mass.
F. E. Newberry,
Avon, N. J.

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

Performance

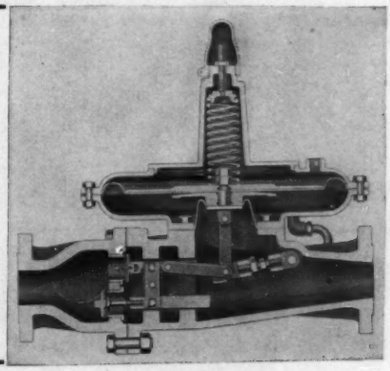


REYNOLDS Toggle Type Regulators for industrial Gas Control, proved by performance in actual operation, guarantee smooth, constant outlet pressure and volume even though inlet pressure and volume are decidedly jumpy. Some of their outstanding features are: Removable Valve Pocket and Orifices; Side Hand Holes; Streamlining that directs the flow of Gas, increasing capacity and range; pressure reduction* from pounds to pounds and pounds to inches W. C.; single or double valve construction; spring or dead weight type adjustment and equipped with or without pilot control.

*Body of Regulator is so machined that a pounds to pounds diaphragm casing, or a pounds to inches W. C., diaphragm casing may be used or interchanged. Also equipped with removable inlet spool with orifices which permits installation of various sizes of orifices while Regulator is in pipe line.

ABOVE—
Cross-section view—
REYNOLDS
Dead Weight—
Single Balanced Valve,
Toggle Type Regulator

AT THE RIGHT—
Cross-Section
REYNOLDS NEW
Streamlined Regulator
which guarantees
greater capacity—
truer response—more
uniform performance



REYNOLDS BRANCH OFFICES: 421 Dwight Bldg., Kansas City, Mo.; 2nd Unit, Santa Fe Bldg., Dallas, Tex. REPRESENTATIVES: Eastern Appliance Co., Boston, Mass.; F. E. Newberry, Avon, N. J.

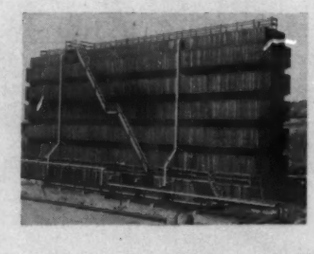
REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

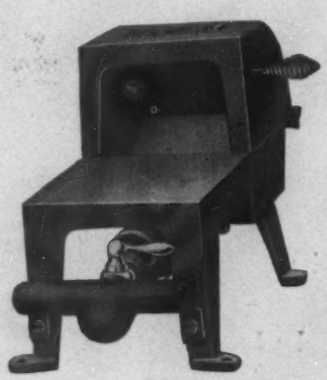
GAS CONTROL SINCE 1892

FOR OBVIOUS REASONS, we wish to call to the attention of the oil and gas industries the fact that all designs for Fluor Aerator Type Cooling Towers, as well as for Fluor Aerator installations on existing towers, are fully covered by United States Patents Nos. 1593252, 1624324, 1632397, 1786076, 1829744, 1830366, 1874020, 1907330, 1916724, 1953372, and other patents pending.

We suggest that in making your selection of a cooling tower the efficiencies and economies effected by the many patented features of Fluor Cooling Towers be fully considered.

A new Bulletin, No. T236, has been recently prepared containing valuable descriptive and engineering data on Fluor Aerator Type Cooling Towers. Your request for copies of this new Bulletin should be addressed to The Fluor Corporation, Ltd., 909 E. 59th St., Los Angeles, Calif., or to any of the following branches: 909 McCormick Bldg., Chicago, Ill.; 703 Fairfax Bldg., Kansas City, Mo.; 1402 Esperson Bldg., Houston, Texas; 220 E. 42nd St., New York City, N. Y.; 719 McBirney Bldg., Tulsa, Okla.





JOHNSON NO. 501 BENCH FURNACE

This quick-acting, inexpensive soldering furnace is used extensively by machinists, battery men, auto mechanics, sheet metal workers, and plumbers. Heats soldering coppers up to six pounds per pair. No forced air blast. Send for descriptive catalog.

JOHNSON GAS APPLIANCE CO. Cedar Rapids IOWA

Western Representative: C. B. BABCOCK CO. 135 Bluxome Street San Francisco, Calif.

Eastern Representative: J. H. McPHERSON 250 Stuart Street Boston, Mass.

Gauging and Control of Natural Gas Wells

DETAILED results of several years of research pertaining to gauging and control of natural-gas wells are presented in Monograph 7 of the Bureau of Mines, Department of the Interior, issued recently with cooperative assistance of the Natural Gas Department, American Gas Association. E. A. Rawlins and M. A. Schellhart of the Bureau staff are the authors. This volume shows how back-pressure data on natural-gas wells may be applied advantageously in production practices, thereby conserving natural gas resources for efficient utilization.

The capacities of natural-gas wells to produce gas usually have been described in terms of the "open-flow" delivery and the shut-in pressure at the well-head. One of the common methods of determining the "open-flow" capacity of a gas well is to measure the impact pressure with a Pitot tube while the well is flowing "wide open." Such practice, however, wastes gas, and the data obtained do not furnish adequate information about the ability of gas wells to deliver gas into pipe-line systems.

In many wells the quantity of gas lost to the air is small compared with underground losses or depreciated recoveries that result from "open flowing." Extreme conditions of flow cause sand and lime formations in wells to cave, aggravate water "coning," and increase the possibility of trapping gas in the underground reservoir with water. Also, under such conditions of flow, abrasive material often is carried with the gas from the well at high velocity, damaging well equipment and creating an operating hazard.

Another disadvantage of the "open-flow" method is that data obtained during such tests cannot be used as a reliable basis for estimating the ability of the wells to produce gas under different operating conditions, as there is no definite relationship applicable to all gas wells between the working pressure, expressed in percentage of the shut-in pressure at the well-head, and the delivery, expressed in percentage of the open flow.

Monograph 7 is a comprehensive development of the fundamental basis for controlling and gauging natural gas wells, presented by H. R. Pierce and E. L. Rawlins in Bureau of Mines Reports of Investigations 2929 and 2930, issued in 1929. In addition, it includes an analysis of the application of back-pressure data to gas-production problems.

Results of tests on 582 gas wells in the principal gas-producing areas of the United States show that when the rates of delivery from a normal gas well are plotted on logarithmic paper against the respective differences of the squares of the formation pressure and the pressure at the sand face, the plotted relationship is a straight line conforming to a simple mathematical formula. Most of the interpretation necessary for applying data from back-pressure tests to gas-production problems can be made from simple calculations based directly on the plotted relationship and it is not necessary to use the formula.

For practical purposes data required for interpretation of back-pressure tests on average gas wells can be observed at the well-heads, although the final interpretation of

gas deliveries and the capability of wells to supply gas at different back pressures is based upon conditions in the gas reservoirs.

It is common practice to measure pressure at the wellhead, and under normal conditions shut-in formation pressures and back pressures at the face of the sand can be calculated from the wellhead data, provided the specific gravity of the gas, the depth of the producing stratum, and the diameter of the producing string in the well are known. The authors describe the appropriate use of dead-weight and spring gauges for measuring pressures, and of orifice meters, critical-flow provers, and other equipment for measuring rates of flow.

The 210 pages and 66 illustrations of Monograph 7 comprise a text book on natural gas production operations. Six tables readily adaptable for routine computation of the results of back-pressure tests are included.

Information gained from back-pressure tests can be applied to the solution of such natural-gas production problems as the effect on delivery capacities of liquid in the well bore and in the producing formation, the rate at which gas should be produced, the variation in gas availability due to the variation in rate of flow stabilization, the effect of treating gas wells with acid, the possible effect of shooting, the accumulation of cavings in the well bore, the changes in producing characteristics of a well during its producing life, and the storage of natural gas in depleted reservoirs.

Results of back-pressure tests on gas wells not only can be interpreted to give the open-flow delivery and gas-delivery capacity of individual wells but can be applied to a group of wells in a field to determine the rate of availability of gas at different operating pressures for pipe-line requirements, thus aiding in formulation of development programs; also for determining the shut-in formation pressure corresponding to the minimum wellhead pressure and rate of delivery at which a number of wells can be operated economically. These data provide an important source of information in deciding how the gas wells of a system should be operated and whether additional gas wells should be drilled.

The American Gas Association, under a cooperative agreement with the Bureau of Mines, bore the cost of printing Monograph 7, "Back-Pressure Data on Natural-Gas Wells and Their Application to Production Practices." Copies are on sale by the A.G.A., 420 Lexington Avenue, New York, price $1.50.

■ ■

Erwin Appointed to New Crane Co. Post

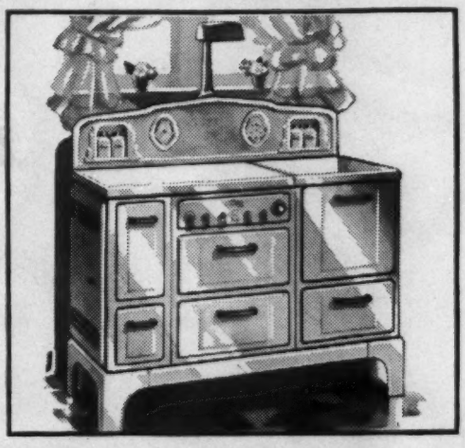
Crane Co., Chicago, announces the appointment of George L. Erwin, Jr., as assistant to P. R. Mork, vice-president in charge of sales.

Mr. Erwin, an engineering graduate of Cornell University, comes to Crane Co. with the benefit of wide experience in sales and advertising. To take up his new duties, he has resigned his position as general sales manager of Kearney & Trecker Corp., Milwaukee. In his newly created position of assistant vice-president of Crane Co., Mr. Erwin will develop sales and market research activities.

★ *This* **IS** *Frontpage* **NEWS!**

WEDGEWOOD'S NEW

LOW-TEMPERATURE OVEN BURNER



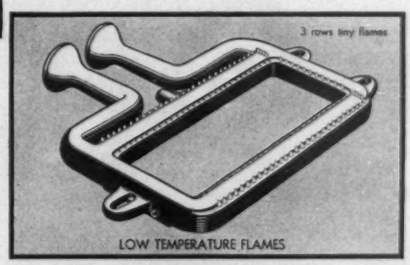
Like magic, Wedgewood's new low-temperature oven burner opens a new world of oven cookery! S-l-o-w roasting seals in natural juices, making meats the most delicious and digestible you have ever tasted! Decreases meat shrinkage about 20%! Bakes the most delicate cakes and custards better than any other method. Takes practically all of the hard work out of baking and roasting. Wedgewood's new low-temperature oven burner plus the aluminum Astogril Broiler and the new Speed-plus-Simmer burner make Wedgewood gas ranges the finest of all cooking methods.

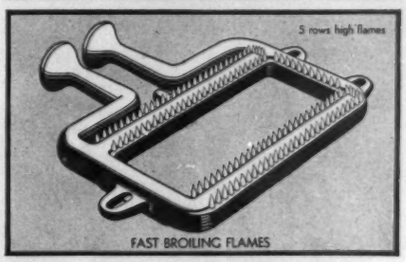
NEWEST GRAYSON CONTROL . . .

Both the low flames and the fast broiling flames of the new Wedgewood burner are controlled automatically by the latest Grayson Oven Regulator. When turned to the low-temperature point this marvelous Grayson control automatically turns off practically half of the entire burner and reduces the remaining flames to tiny, blue cones.

ON THE LATEST 1936 DELUXE WEDGEWOOD MODELS

★ SELF-LIGHTING BURNER—NO MATCHES
★ NO OVEN PRE-HEATING
★ NO SEARING OF MEATS
★ NO COVERING
★ NO BASTING OF FOWL OR ROAST
★ TENDERIZES ALL MEATS
★ REDUCES MEAT SHRINKAGE
★ NO OVEN WATCHING OR OPENING
★ SEARS IN FLAVORS AND JUICES
★ PERFECT FRUIT AND SPONGE CAKE
★ PERMITS OVEN CANNING
★ REDUCES AMOUNT OF WORK
★ KEEPS KITCHEN COOLER





JAMES GRAHAM MANUFACTURING CO.
SAN FRANCISCO • LOS ANGELES • NEWARK • PORTLAND

WEDGEWOOD
. . . The MODERN GAS RANGE

PORCELAIN ENAMEL INSTITUTE, INC.
612 NORTH MICHIGAN AVENUE • CHICAGO

Please send me, absolutely free, a copy of your new, easy-reading, profusely illustrated sales manual on Porcelain Enamel.

Name_____

Firm_____

Address_____

Portland Employees Build "McKeeville"

"THE Building of McKeeville" is the title of the new business drive of the Portland (Ore.) Gas & Coke Co. which was conducted from February 3 to March 23, and was named in honor of Paul B. McKee, president of the company. According to the information supplied to *GAS* by B. H. Parkinson, commercial manager, "McKeeville" is a mythical city whose population consists of homes which were not gas customers. To add stimulus to the campaign it was sponsored by Hilmar Papst, vice-president and general manager, and was presented by him as a completed city to Mr. McKee on March 24, on which date the meters of new customers were turned on.

The Building-of-McKeeville effort was open to all employees of the company, and unlike most new business campaigns, was not a prospect drive. Each employee in order to get credit for his participation had to get a signed application for gas service on a company application blank. If an employee encountered a prospect the turning on of whose meter was contingent upon the sale of an appliance, he was given the aid of a salesman to close the deal and was given credit as though it were a direct turn-on.

The town of McKeeville was comprised of 11 sub-divisions, each in charge of a Crew Manager after whom the respective sub-divisions were named. These sub-divisions competed against each other, each striving to exceed its quota by the greatest margin. The quota set up for all the districts combined was 2,087 turn-ons in a field of six or eight thousand prospects.

A $1 bonus was paid to employees for applications for service under the following provisions: (1) A service application for a residence, commercial, or an industrial plant, not using gas but occupied by the same party on January 15, 1936, and not disconnected by the credit department since December 1, 1935, was credited as a new customer. (2) An application for additional service such as house heating service where domestic or commercial service was in use or vice versa was counted as a new customer. (3) Credit was given to the employee bringing in the signed application, regardless of previous contacts by fellow employees.

The following special inducements were offered during the campaign period: (1) No customer deposit was required on any residential applications passed by the credit department. (2) Former customers whose service was discontinued prior to December 1, 1935, were allowed to pay off old accounts in small monthly installments with their current service bills, with a cash discount allowed on the current service bill if the current bill and arrears installment were paid in full within the discount period. (3) Appliances not in use were connected for the company's actual cost and the customer allowed to pay this sum in small installments with the bill each month.

The quota established was aimed at an increase in annual revenue of some $48,000, based on an average annual revenue of $24 per customer. During the building of McKeeville 2,435 meters, representing $72,633 in earned annual revenue, were connected. Of this total, 428 were former customers owing old accounts amounting to an aggregate of $5,764 outstanding.

To record results as the Building of McKeeville progressed, a map of the town, with each sub-division marked off in a number of squares to correspond with the respective Crew Manager's quota, was used as a progressive bulletin in each of the departments of the company. When a customer was secured, a square within the proper sub-division was blocked in, each crew using a different colored crayon.

Climax of the campaign was the election of a "Mayor of McKeeville." The several Crew Managers were "candidates" for this "office," as was the top ranking salesman of the Portland District commercial department. The Portland commercial department was represented by the sub-division of "Commercial View." The candidate of the sub-division which exceeded its campaign quota of new customers by the largest percentage was declared Mayor. Thus each prospective gas customer represented a vote. The candidate winning the election for Mayor was rewarded with a trip to a track meet at Stanford University in Palo Alto, Calif., with all expenses paid as the personal guest of Mr . McKee.

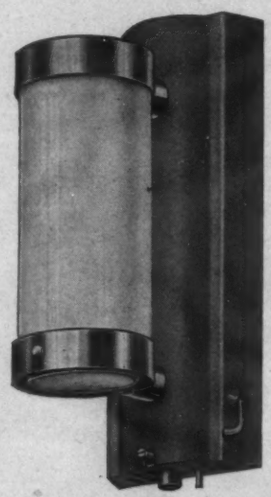
The five Crew Managers ranking next in percentage of quota were elected "City Commissioners." The Crew Manager whose sub-division lagged furtherest behind in comparison to its set quota was declared "Official Dog Catcher of McKeeville."

A LIGHTING SENSATION!

The HUMPHREY OPALITE No. 1

A MODERN GAS LAMP for

- HOMES
- OFFICES
- SHOPS
- STORES
- THEATRES



The Humphrey Opalite is available in beautiful finishes of *IVORY, GREEN, WHITE, BLUE, YELLOW* and *BLACK*, with sparkling Chrome Trim.

A NEW OUTLET FOR GAS SALES!

The Humphrey Opalite Gas Lamp opens an entirely new field for gas load building. These beautiful lamps give an abundance of comfortable light and possess eye appeal that insures a ready acceptance from your trade. Domestic lighting loads are valuable. Secure them with this smart lamp. Write for complete information.

General Gas Light Company

KALAMAZOO, MICHIGAN

E. H. Adams Joins Merco at Los Angeles

E. H. ADAMS, chemical engineer, well known on the Pacific Coast, has become associated with Merco Nordstrom Valve Co. and Pittsburgh Equitable Meter Co. He will make his headquarters in the Los Angeles office of these organizations.

E. H. ADAMS

For many years Mr. Adams has been active in the natural gas industry and has been associated with various companies in charge of production. He is also well known in oil, chemical and hydraulic circles. He is a member of the California Natural Gasoline Association and the Southern California Meter Association. He is a graduate of the University of California.

In his new position Mr. Adams will devote his time to sales and engineering work in the interest of Pittsburgh meters, Nordstrom valves and allied products. He will cover Southern California, working under H. Boezinger, manager of the Los Angeles office.

Payne Leads!

WITH NEW GAS HEATING PRODUCTS

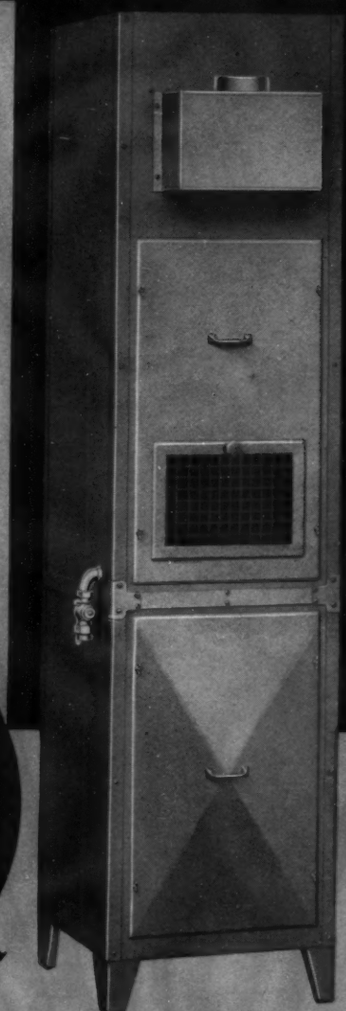
Manufacturing Background

Twenty-three years of manufacturing gas burning heating equipment has resulted in the production of a complete line of modern appliances designed to help you to build the load on your lines and to create and maintain the good will of your customers. The increased and completely modernized Payne factory advances our facilities to meet the demand for gas appliances of quality and assures prompt deliveries on your orders.

Dependable Sales Features

The attractively designed and finished models from our factory have been produced with the utmost consideration for customer satisfaction. In striving to make our products appealing to the eye we have sacrificed none of the features which have characterized Payne equipment and helped us to build a reputation for efficiency, dependability and durability in all Payne Models. Write for copy of our latest catalog describing our newest equipment.

CONSOLE HEATER

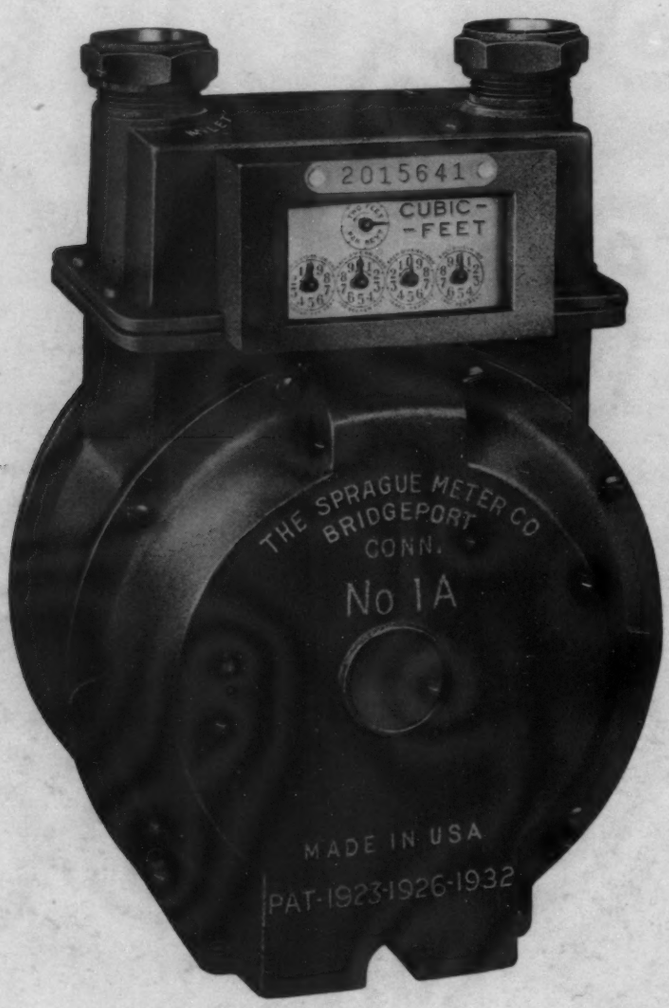


FORCED AIR UNIT

WINTER AIR CONDITIONER

PAYNE FURNACE & SUPPLY COMPANY

BEVERLY HILLS · CALIFORNIA



SPRAGUE METERS

REDUCE OPERATING COSTS

THE SPRAGUE METER COMPANY

LOS ANGELES + + SAN FRANCISCO

BRIDGEPORT, CONN.